EDA

Abhishek Reddy–1NT20SDS01

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import dataset

```
df = read.csv("D:/Abhi reddy/NMIT M.tech/covid_data_kerala.csv")
View(df)

head(df)

##          Date Confirmed Recovered Deceased
## 1 2020-01-30        NA        NA       NA
## 2 2020-01-31         0        NA        0
## 3 2020-02-01         0        NA        0
## 4 2020-02-02         1        NA        0
## 5 2020-02-03         1        NA        0
## 6 2020-02-04         0        NA        0

nrow(df)

## [1] 552

ncol(df)

## [1] 4

head(df)

##          Date Confirmed Recovered Deceased
## 1 2020-01-30        NA        NA       NA
## 2 2020-01-31         0        NA        0
## 3 2020-02-01         0        NA        0
## 4 2020-02-02         1        NA        0
## 5 2020-02-03         1        NA        0
## 6 2020-02-04         0        NA        0

head(df,6)

##          Date Confirmed Recovered Deceased
## 1 2020-01-30        NA        NA       NA
## 2 2020-01-31         0        NA        0
## 3 2020-02-01         0        NA        0
## 4 2020-02-02         1        NA        0
## 5 2020-02-03         1        NA        0
## 6 2020-02-04         0        NA        0

tail(df)

##            Date Confirmed Recovered Deceased
## 547 2021-07-29     22064     16649      128
```

```
## 548 2021-07-30    20772    14651    116
## 549 2021-07-31    20624    16865     80
## 550 2021-08-01    20728    17792     56
## 551 2021-08-02    13984    15923    118
## 552 2021-08-03    23676    15626    148
```

```
summary(df)
```

```
##      Date             Confirmed          Recovered          Deceased
##  Length:552        Min.   :    0.0   Min.   :    0.0   Min.   :  0.00
##  Class :character  1st Qu.:  107.5   1st Qu.:  748.5   1st Qu.:  0.50
##  Mode  :character  Median : 3361.0   Median : 4333.0   Median : 16.00
##                    Mean   : 6259.8   Mean   : 6583.1   Mean   : 31.04
##                    3rd Qu.: 7113.0   3rd Qu.: 7186.0   3rd Qu.: 27.00
##                    Max.   :43529.0   Max.   :99651.0   Max.   :227.00
##                    NA's   :1         NA's   :57        NA's   :1
```

```
sum(is.na(df))
```

```
## [1] 59
```

```
df[is.na(df)] = 0
```

```
mean(df$Confirmed)
```

```
## [1] 6248.457
```

```
mean(df$Recovered)
```

```
## [1] 5903.348
```

```
mean(df$Deceased)
```

```
## [1] 30.9837
```

```
var(df$Confirmed)
```

```
## [1] 74251993
```

```
var(df$Recovered)
```

```
## [1] 82567148
```

```
var(df$Deceased)
```

```
## [1] 2246.444
```

```
cov(df$Confirmed,df$Recovered)
```

```
## [1] 63732787
```

```
cov(df$Confirmed,df$Deceased)
```

```
## [1] 272471.4
```

```
cor(df$Confirmed,df$Recovered)
```

```
## [1] 0.813964
```

```
cor(df$Confirmed,df$Deceased)
```

```
## [1] 0.6671431
```

```
sd(df$Confirmed)
```

```
## [1] 8616.96
```

```
sd(df$Recovered)
```

```
## [1] 9086.647
```

```
sd(df$Deceased)
```

```
## [1] 47.39667
```

```
sd(df$Confirmed)/sqrt(df$Confirmed)
```

```
##   [1]        Inf        Inf        Inf 8616.95959 8616.95959        Inf
##   [7]        Inf        Inf        Inf        Inf        Inf        Inf
##  [13]        Inf        Inf        Inf        Inf        Inf        Inf
##  [19]        Inf        Inf        Inf        Inf        Inf        Inf
##  [25]        Inf        Inf        Inf        Inf        Inf        Inf
##  [31]        Inf        Inf        Inf        Inf        Inf        Inf
##  [37]        Inf        Inf        Inf 3517.85902 3046.55528        Inf
##  [43] 6093.11056 4975.00394        Inf 6093.11056 4975.00394        Inf
##  [49]        Inf 8616.95959 2487.50197 2487.50197 2224.88940 1628.45230
##  [55] 2302.97932 2872.31986 1976.86611 1379.81783 3517.85902 1926.81074
##  [61] 1523.27764 3256.90459 1758.92951 1880.37474 2872.31986 2598.11107
##  [67] 3046.55528 2389.91459 3046.55528 2872.31986 2487.50197 3256.90459
##  [73] 2724.92188 6093.11056 4975.00394 3046.55528 8616.95959 3256.90459
##  [79] 8616.95959 4308.47980 6093.11056 3517.85902 1976.86611 2598.11107
##  [85] 2724.92188 4975.00394 3256.90459 2598.11107 2389.91459 4308.47980
##  [91] 2724.92188 6093.11056        Inf 6093.11056        Inf        Inf
##  [97] 4975.00394        Inf        Inf 8616.95959 6093.11056 3256.90459
## [103] 3256.90459 3853.62148 2724.92188 1689.92481 2154.23990 2598.11107
## [109] 2302.97932 1600.12923 2487.50197 1758.92951 1758.92951 1329.62573
## [115] 1094.35496 1183.63043 1230.99423 1052.72917 1362.46094  934.64049
## [121] 1094.35496 1131.46223 1103.28862 1141.34418  929.19065  951.58400
## [127]  888.77152  817.88561  829.16732  833.03293  903.30281  903.30281
## [133] 1068.80230  945.83419  975.67854  934.64049 1172.61967  951.58400
## [139]  969.48370  995.00079  874.91969  793.25543  764.63152  747.18516
## [145]  733.52431  725.67891  698.92772  776.96508  703.57180  617.07329
## [151]  793.25543  780.14287  752.86726  701.23823  681.23047  593.21596
## [157]  556.22235  574.46397  620.26232  522.47992  496.67329  468.00900
## [163]  422.48120  390.07143  413.15159  406.65947  349.46386  345.23120
## [169]  320.69003  306.38381  353.85612  300.73396  305.80445  321.13512
## [175]  267.45787  262.44885  289.65593  259.45754  283.01809  325.22618
## [181]  252.24271  286.75446  383.07058  238.07753  256.45259  252.02684
## [187]  277.82193  261.84231  249.27005  239.17551  243.62699  228.67036
## [193]  247.61787  250.42530  228.91230  247.51570  217.88919  217.54173
## [199]  214.88744  220.29688  207.47201  205.51552  178.40075  194.24127
## [205]  193.50523  184.89457  197.27174  244.50810  176.81628  173.17242
## [211]  175.67350  170.87592  176.00299  185.66550  220.29688  255.21232
## [217]  219.08311  218.65949  173.06761  167.23293  155.21645  212.26356
## [223]  156.64610  147.73619  148.90061  157.63903  160.42836  153.80073
## [229]  170.97681  151.97200  139.23700  130.63499  133.48802  126.44683
## [235]  125.74479  159.73775  134.16588  117.52342  108.35729  107.06983
## [241]  102.94826   99.86693  127.91510  100.48292   91.70092   95.53781
## [247]   89.55616   97.35590   93.17402  121.35359   97.12680   83.67163
```

```
## [253]  116.77641   89.59488   79.47723   89.12877  111.89913   92.04557
## [259]  109.04923   97.63673  100.97152   90.75010   98.64233  121.59500
## [265]  106.13983   94.19271   99.61969   93.40363   94.85236  104.16715
## [271]  131.60649  116.64794   91.90933  102.84555  105.76341   96.44306
## [277]  102.80894  133.95496  104.02284   93.37621  104.34265  102.97766
## [283]  101.54479  116.83006  143.75582  111.15188  102.94091  115.80220
## [289]  113.10723  108.07567  127.31334  165.52722  113.22434  107.55247
## [295]  113.91479  110.98580  113.42033  118.88006  140.58321  117.04542
## [301]  106.95430  117.50157  136.82886  108.99688  114.70941  148.17238
## [307]  117.53435  108.42589  117.52342  113.95463  112.68092  124.67416
## [313]  150.64246  121.47411  123.41466  128.88438  126.47407  111.72029
## [319]  125.71803  165.61891  119.28945  109.56812  122.24175  116.65863
## [325]  108.62385  114.02445  147.28232  110.79299  109.71012  119.76088
## [331]  117.29455  145.09463  123.03666  156.10537  112.30705  108.84026
## [337]  119.32375  121.97204  118.05162  127.05014  156.77568  114.99506
## [343]  107.76252  121.24543  120.16778  115.89642  127.81656  154.51614
## [349]  116.11719  111.20741  116.29683  114.90301  111.61715  121.80133
## [355]  148.96735  109.55926  104.38092  108.27172  104.85899  103.28790
## [361]  110.91223  148.63456  108.62385  114.54713  113.43015  108.84026
## [367]  108.71891  118.74453  146.51388  113.97457  108.08418  110.31078
## [373]  115.04629  111.78608  110.55564  140.86470  119.33519  111.43034
## [379]  118.57578  117.29455  116.49860  126.88474  160.45617  122.63728
## [385]  123.20004  127.27167  128.38275  126.36523  135.06936  183.21520
## [391]  135.67071  134.47594  142.10431  142.22039  139.93292  151.05854
## [397]  195.73891  158.97475  163.87265  168.47489  163.54766  163.10758
## [403]  188.03747  229.31724  179.05431  173.20740  186.57722  204.24153
## [409]  191.01693  203.55654  265.42006  194.14265  188.12708  197.73865
## [415]  193.45645  189.03024  199.00016  244.80394  193.40772  173.87609
## [421]  193.21314  201.70777  190.08513  183.04977  218.94163  176.29743
## [427]  167.29595  162.90342  172.06411  170.94316  162.78710  177.49015
## [433]  145.61160  145.61160  130.60498  121.10166  109.48849  103.09551
## [439]  114.21460   99.40073   91.97213   95.59070   86.03634   73.25959
## [445]   63.77337   73.77058   61.58586   57.55650   52.44600   51.08999
## [451]   52.74976   51.07025   58.24132   47.56543   46.05103   43.85519
## [457]   44.67745   45.64672   48.20116   53.42881   44.68286   42.07000
## [463]   41.81611   43.93892   42.06098   45.54141   51.97451   44.62291
## [469]   41.30139   43.10905   46.26226   47.66647   49.99730   58.90157
## [475]   48.67717   47.60678   49.34785   50.02341   51.02993   53.62607
## [481]   64.54878   49.91419   50.77768   55.43087   57.68016   56.19531
## [487]   61.09322   77.69651   61.30002   61.45416   62.75724   67.64071
## [493]   65.46058   71.13927   89.29132   69.06398   67.69287   71.74823
## [499]   72.22804   73.26753   80.06170   98.07844   77.86763   74.80293
## [505]   77.16818   80.84362   77.24876   79.84487   99.84011   76.71424
## [511]   76.20259   78.40731   80.19334   78.27779   82.51658   95.96342
## [517]   74.02602   73.73276   75.96237   78.35219   77.20844   78.33600
## [523]   96.11852   71.87541   68.99089   73.42696   73.99054   72.60137
## [529]   77.95042   97.58037   71.46391   68.90922   73.42429   73.48568
## [535]   67.81015   72.94131   86.46843   66.38652   65.17348   76.11039
## [541]   65.10462   63.30013   65.20146   80.05478   57.92595   58.02173
## [547]   58.01121   59.78812   60.00226   59.85154   72.86825   56.00153
```

```
sd(df$Recovered)/sqrt(df$Recovered)
```

```
## [1]      Inf      Inf      Inf      Inf      Inf      Inf
## [7]      Inf      Inf      Inf      Inf      Inf      Inf
```

4

```
## [13]        Inf        Inf        Inf        Inf        Inf        Inf
## [19]        Inf        Inf        Inf        Inf        Inf        Inf
## [25]        Inf        Inf        Inf        Inf        Inf        Inf
## [31]        Inf        Inf        Inf        Inf        Inf        Inf
## [37]        Inf        Inf        Inf        Inf        Inf        Inf
## [43]        Inf        Inf        Inf        Inf        Inf        Inf
## [49]        Inf        Inf        Inf        Inf        Inf        Inf
## [55]        Inf        Inf        Inf 5246.17792 3212.61475 4543.32335
## [61]        Inf 4543.32335 6425.22950 6425.22950 2428.50848 3212.61475
## [67] 3709.60798 5246.17792 2623.08896 2520.18235 2520.18235 1748.72597
## [73] 2084.61972 1514.44112 2084.61972 2520.18235 3434.42963 1748.72597
## [79] 2873.44999 6425.22950 2520.18235 1982.86887 2271.66167 9086.64670
## [85] 3212.61475 2346.16209 3434.42963 4543.32335 2520.18235 4543.32335
## [91] 2873.44999 2428.50848 3028.88223 3212.61475 9086.64670 1163.42589
## [97]        Inf 3434.42963 4063.67194 2873.44999 9086.64670 4543.32335
## [103]        Inf        Inf 9086.64670 5246.17792        Inf 4543.32335
## [109]        Inf        Inf        Inf 4063.67194 3212.61475 6425.22950
## [115] 5246.17792 4063.67194 2623.08896 2873.44999 2873.44999 5246.17792
## [121] 2873.44999 2873.44999 2346.16209 2141.74317 2084.61972 1854.80399
## [127] 1455.02796 1937.27959 1285.04590 1419.09580 2739.72706 1558.34705
## [133] 1203.55576 1154.00528 1606.30737 1339.75296 1214.25424 1063.51155
## [139] 1173.08104  957.81666  963.18262  927.40200 1203.55576  942.24137
## [145]  968.63979 1173.08104 1009.62741 1248.14691 1127.05981  899.71209
## [151] 1402.10003 1022.32763 1049.23558  790.89108  639.33423  640.92264
## [157]  628.53649  809.50283  703.14583  854.79982  886.76592  744.40710
## [163]  858.60741  759.86357  790.89108  713.91439  675.40513  649.04619
## [169]  601.77788  787.91219  636.19252  692.85032  580.52456  548.94440
## [175]  550.95888  437.18149  292.05589  280.55363  346.17367  332.90898
## [181]  348.71350  357.78636  323.28838  309.13400  331.35591  346.42516
## [187]  318.29135  284.37458  258.67000  321.26147  318.48680  219.41766
## [193]  291.75464  324.52310  240.62674  306.31080  328.31389  251.63141
## [199]  320.66080  274.09732  270.19191  245.94461  260.47039  260.47039
## [205]  241.21952  252.79727  272.73580  258.25178  238.13485  247.21565
## [211]  199.86346  198.42867  192.63652  216.22619  220.83869  197.76960
## [217]  196.93178  205.77203  174.35675  197.76960  193.90432  191.73384
## [223]  210.57839  200.30000  223.22477  249.53524  206.08933  210.97534
## [229]  197.81646  180.58089  191.01231  173.68657  173.46489  169.85128
## [235]  173.24406  165.18446  165.70550  167.27038  161.43997  154.01096
## [241]  160.65584  156.04137  157.06369  155.37838  152.80850  170.86926
## [247]  142.04823  135.81840  130.46319  133.39657  128.74945  115.76520
## [253]  108.58294  101.28839  104.43732   96.18866  102.64940  103.39764
## [259]  102.93882  107.97561  110.46013  101.64899   99.08448  105.14107
## [265]  105.80900  109.87714  104.27902  116.17132  112.98444  103.89659
## [271]  107.78554  108.49002  103.82197   98.70960  102.70184  106.13330
## [277]   98.49481  107.77795   96.85297  100.30853  103.55867  102.53171
## [283]  107.68709  109.76485  117.47464  111.02763  106.70254  116.16182
## [289]  115.39122  110.24854  111.14385  112.12956  111.67981  108.09779
## [295]  109.70883  113.60084  110.85399  115.15007  123.36835  126.63163
## [301]  119.62329  117.60248  134.79832  125.11011  118.69100  116.77411
## [307]  115.85927  118.05819  121.53399  122.56890  119.10833  125.80364
## [313]  132.47192  132.05159  133.29606  130.51701  131.87069  125.19321
## [319]  125.31220  135.74260  127.66476  120.06105  128.89185  132.52827
## [325]  131.85681  135.89432  135.54613  127.77832  131.04529  131.14079
## [331]  135.36552  147.75524  154.41070  140.67972  128.13354  120.28174
```

```
## [337]  123.92930  127.10151  128.69778  132.99589  126.68085  129.51881
## [343]  127.11394  121.00480  124.53305  123.37973  133.12428  145.09413
## [349]  139.05599  126.52110  137.97771  133.93163  128.36347  136.86199
## [355]  145.11263  138.63456  105.88800  115.13158  116.26637  125.01535
## [361]  126.33754  121.36043  124.93261  128.42756  121.49053  113.60084
## [367]  108.35881  120.04010  125.82777  119.86242  113.76097  114.11028
## [373]  111.40249  115.60582  117.81977  117.71097  112.92335  119.88328
## [379]  120.44012  124.43959  118.95514  132.65531  127.57666  123.20948
## [385]  130.71944  126.09402  130.42287  118.89403  137.85063  128.03175
## [391]  130.84135  118.44873  133.22441  141.18826  133.25305  138.04138
## [397]  154.14386  153.32974  143.11898  140.95026  150.65110  153.22071
## [403]  142.97718  165.07539  137.20481  140.34373  148.32500  156.36448
## [409]  159.24340  159.68540  154.41070  169.20220  171.26335  197.39592
## [415]  204.98513  193.24545  191.52078  216.22619  194.97267  200.20275
## [421]  210.40896  207.53559  199.04661  211.08916  208.62674  205.98340
## [427]  201.23107  212.12195  190.00742  223.02297  194.92780  210.35257
## [433]  208.57178  205.50872  193.50819  182.64847  178.75467  187.12497
## [439]  182.68538  167.04411  176.78167  174.87260  147.56028  150.32090
## [445]  134.48791  138.48957  145.87732  123.30019  113.85023  120.74812
## [451]  108.09014  100.82591  101.95566   66.96400   72.97393   62.53135
## [457]   68.68859   73.00219   71.18084   65.03915   56.19328   59.77798
## [463]   55.14457   55.64899   54.83843   53.06846   51.43559   50.03703
## [469]   48.85012   49.47390   51.34518   52.95659   49.06614   28.78477
## [475]   42.40083   41.29739   43.13838   44.85825   42.64575   47.03879
## [481]   47.86491   49.72215   48.20994   51.99675   56.06265   54.20639
## [487]   53.34667   53.48141   58.51160   52.71897   55.74630   56.50533
## [493]   58.65039   62.07299   61.37245   64.22180   63.87495   67.73916
## [499]   73.32950   67.40658   68.00041   70.22423   78.10134   72.54475
## [505]   77.87728   82.44591   79.25439   81.40706   77.92881   83.89859
## [511]   77.68067   84.84785   86.41808   86.15355   81.76220   84.62678
## [517]   89.60737   83.62102   84.49862   89.78216   81.22472   84.54615
## [523]   85.30653   87.63533   84.26213   85.05203   88.87148   83.41289
## [529]   81.26694   84.92935   89.39896   79.77498   81.69939   87.85625
## [535]   79.09810   76.91715   79.07114   82.77021   76.43939   78.33898
## [541]   86.37512   72.96923   73.58875   74.41075   78.45277   68.18203
## [547]   70.42220   75.07062   69.96977   68.12261   72.00973   72.69085
```

```
sd(df$Deceased)/sqrt(df$Deceased)
```

```
##   [1]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##   [8]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [15]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [22]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [29]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [36]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [43]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [50]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [57]      Inf      Inf 47.396671      Inf      Inf 47.396671      Inf
##  [64]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [71]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [78]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [85]      Inf 47.396671      Inf      Inf      Inf      Inf      Inf
##  [92]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
##  [99]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
## [106]      Inf      Inf      Inf      Inf      Inf      Inf      Inf
```

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```
## [113]        Inf 47.396671        Inf 47.396671 47.396671        Inf        Inf
## [120] 47.396671 47.396671 47.396671 47.396671        Inf 47.396671        Inf
## [127] 27.364481        Inf 47.396671        Inf 47.396671        Inf 47.396671
## [134] 47.396671 47.396671        Inf        Inf 47.396671        Inf        Inf
## [141] 47.396671        Inf        Inf        Inf        Inf 47.396671        Inf
## [148]        Inf        Inf        Inf        Inf 47.396671 47.396671 47.396671
## [155]        Inf        Inf        Inf        Inf 33.514507        Inf        Inf
## [162]        Inf        Inf 33.514507 33.514507 33.514507 47.396671 47.396671
## [169] 33.514507 47.396671 33.514507 33.514507 47.396671 47.396671 47.396671
## [176] 21.196435 23.698335 21.196435 33.514507 33.514507 23.698335 47.396671
## [183] 33.514507 27.364481 16.757254 47.396671 33.514507 27.364481 17.914258
## [190] 27.364481 21.196435 23.698335 33.514507 17.914258 21.196435 19.349610
## [197] 27.364481 14.988143 17.914258 14.988143 13.145471 19.349610 17.914258
## [204] 15.798890 13.682240 12.237768 21.196435 14.290634 14.988143 13.145471
## [211] 14.988143 17.914258 19.349610 17.914258 17.914258 23.698335 17.914258
## [218] 14.988143 14.290634 14.290634 14.988143 13.682240 13.145471 13.682240
## [225] 13.682240 12.667293 12.237768 12.667293 12.237768 13.682240 12.667293
## [232] 15.798890 13.682240 11.171502 11.849168 11.171502 10.873542 10.598218
## [239] 10.342801 10.105004 10.342801 10.342801 10.598218 10.105004  9.882889
## [246]  8.801341 10.598218 10.105004  9.882889  9.882889  9.479334 10.105004
## [253]  9.674805  9.479334  9.882889  9.479334 10.105004 10.342801 10.598218
## [260]  9.882889  9.674805  9.295252 10.105004 10.342801  9.674805  9.295252
## [267]  9.882889  9.295252  9.479334  9.295252 10.598218  9.674805  9.121494
## [274]  9.295252  8.957129  9.121494  8.957129 10.342801  9.295252  8.957129
## [281]  9.295252  9.121494  8.957129  9.674805 10.105004  8.957129  8.801341
## [288]  9.479334  9.295252  9.295252 10.342801 10.873542  9.121494  8.957129
## [295]  9.295252  8.957129  9.479334  9.121494 10.105004  9.674805  9.295252
## [302]  9.121494  9.882889  9.479334  9.121494 10.342801  9.295252  8.957129
## [309]  8.512693  8.801341  8.378627  8.957129  9.882889  8.512693  8.011500
## [316]  9.295252  8.801341  8.378627  8.801341  9.674805  8.250701  9.121494
## [323]  9.121494  9.882889  8.801341  8.653409  9.121494  9.121494 10.105004
## [330] 10.105004 11.849168 10.342801  9.479334 12.667293  9.674805  8.957129
## [337]  8.653409  9.882889 10.342801  9.479334 10.873542  9.674805  9.479334
## [344]  9.479334  9.882889 10.105004  9.882889 10.598218  9.479334  9.295252
## [351] 10.873542  9.882889  9.121494 10.342801 11.495381  9.295252 11.171502
## [358] 10.342801 10.873542  9.882889 10.598218 11.495381 10.873542 10.598218
## [365] 10.873542 10.105004 11.171502 10.342801 11.495381 11.849168 10.598218
## [372] 11.495381 10.873542 11.849168 10.873542 11.849168 10.873542 11.171502
## [379] 11.849168 11.171502 11.849168 12.237768 13.145471 11.171502 11.849168
## [386] 12.667293 12.237768 13.145471 12.237768 11.849168 12.667293 11.495381
## [393] 12.667293 12.667293 11.171502 12.237768 13.145471 11.849168 12.237768
## [400] 12.667293 11.849168 11.849168 13.145471 13.682240 11.849168 12.667293
## [407] 13.145471 12.667293 13.682240 12.237768 14.290634 12.237768 13.145471
## [414] 12.237768 11.495381 12.237768 13.145471 13.682240 14.988143 14.988143
## [421] 13.682240 12.667293 12.667293 13.682240 14.290634 11.849168 12.237768
## [428] 14.290634 12.667293 13.682240 14.988143 13.682240 12.667293 11.849168
## [435] 11.171502 10.105004 11.495381 11.849168 14.290634 10.598218 10.105004
## [442] 10.598218 10.342801  9.121494  9.479334 10.342801  8.957129 10.105004
## [449]  8.957129  9.121494  9.479334  8.653409  8.957129  8.378627  7.402116
## [456]  6.841120  6.770953  6.841120  6.770953  7.065478  6.277842  6.223488
## [463]  5.971419  6.449870  5.924584  5.747691  5.878833  5.332542  4.862796
## [470]  4.812403  4.914806  4.837402  5.024037  5.081456  4.812403  4.478564
## [477]  4.189313  3.977440  3.572658  3.456757  3.385476  3.562552  3.857086
## [484]  3.522967  3.402883  3.368335  3.475292  3.593132  3.402883  3.247566
```

```
## [491]   3.831794   4.079256   3.278496   3.145828   3.262921   4.256347   3.794771
## [498]   3.402883   3.603502   3.624514   3.302283   3.735381   3.678695   3.909212
## [505]   5.052502   4.996048   4.419762   4.478564   4.888593   3.991520   3.869922
## [512]   4.064231   4.363217   4.363217   6.019383   4.519095   4.647626   3.977440
## [519]   4.256347   3.922576   4.079256   5.436771   4.692970   3.977440   3.895982
## [526]   3.977440   4.156963   4.539778   4.812403   4.739667   4.256347   4.189313
## [533]   5.081456   4.156963   4.439105   5.266297   6.223488   4.647626   4.625441
## [540]   4.291093   4.125351   4.787787   5.834127   4.079256   3.794771   4.141066
## [547]   4.189313   4.400670   5.299109   6.333647   4.363217   3.895982
```

```
mad(df$Confirmed)
```

```
## [1] 4865.152
```

```
mad(df$Recovered)
```

```
## [1] 4903.699
```

```
mad(df$Deceased)
```

```
## [1] 21.4977
```

```
median(df$Confirmed)
```

```
## [1] 3355
```

```
median(df$Recovered)
```

```
## [1] 3362
```

```
median(df$Deceased)
```

```
## [1] 15.5
```

```
min(df$Confirmed)
```

```
## [1] 0
```

```
min(df$Recovered)
```

```
## [1] 0
```

```
min(df$Deceased)
```

```
## [1] 0
```

```
max(df$Confirmed)
```

```
## [1] 43529
```

```
max(df$Recovered)
```

```
## [1] 99651
```

```
max(df$Deceased)
```

```
## [1] 227
```

```
range(max(df$Confirmed)-min(df$Confirmed))
```

```
## [1] 43529 43529
```

```
range(max(df$Recovered)-min(df$Recovered))
```

```
## [1] 99651 99651
```

```r
range(max(df$Deceased)-min(df$Deceased))
```

```
## [1] 227 227
```

```r
quantile(df$Confirmed,c(0.25, 0.5, 0.75))
```

```
##     25%    50%    75%
##   104.5 3355.0 7069.0
```

```r
quantile(df$Recovered,c(0.25, 0.5, 0.75))
```

```
##      25%     50%     75%
##    59.25 3362.00 6731.00
```

```r
quantile(df$Deceased,c(0.25, 0.5, 0.75))
```

```
##  25%  50%  75%
##   0.0 15.5 27.0
```

```r
IQR(df$Confirmed)
```

```
## [1] 6964.5
```

```r
IQR(df$Recovered)
```

```
## [1] 6671.75
```

```r
IQR((df$Deceased))
```

```
## [1] 27
```

```r
cor(df$Confirmed,df$Recovered, method = "pearson")
```

```
## [1] 0.813964
```

```r
cor(df$Confirmed,df$Deceased, method = "pearson")
```

```
## [1] 0.6671431
```

```r
cor(df$Recovered,df$Deceased, method = "pearson")
```

```
## [1] 0.7497809
```

```r
cor.test(df$Confirmed,df$Recovered, method = "pearson")
```

```
##
##  Pearson's product-moment correlation
##
## data:  df$Confirmed and df$Recovered
## t = 32.86, df = 550, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.7837487 0.8403355
## sample estimates:
##       cor
## 0.813964
```

```r
cor.test(df$Confirmed,df$Deceased, method = "pearson")
```

```
##
##  Pearson's product-moment correlation
##
```

```
## data:  df$Confirmed and df$Deceased
## t = 21.003, df = 550, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.6181020 0.7110113
## sample estimates:
##       cor
## 0.6671431
```

```
cor.test(df$Recovered,df$Deceased, method = "pearson")
```

```
##
##  Pearson's product-moment correlation
##
## data:  df$Recovered and df$Deceased
## t = 26.574, df = 550, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.7108032 0.7841681
## sample estimates:
##       cor
## 0.7497809
```

```
t.test(df$Confirmed,df$Recovered)
```

```
##
##  Welch Two Sample t-test
##
## data:  df$Confirmed and df$Recovered
## t = 0.64748, df = 1098.9, p-value = 0.5175
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -700.7107 1390.9281
## sample estimates:
## mean of x mean of y
##  6248.457  5903.348
```

```
t.test(df$Deceased,df$Recovered)
```

```
##
##  Welch Two Sample t-test
##
## data:  df$Deceased and df$Recovered
## t = -15.184, df = 551.03, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -6632.066 -5112.662
## sample estimates:
## mean of x mean of y
##   30.9837 5903.3478
```

```
t.test(df$Confirmed,df$Deceased)
```

```
##
##  Welch Two Sample t-test
##
## data:  df$Confirmed and df$Deceased
```

```
## t = 16.952, df = 551.03, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5497.039 6937.907
## sample estimates:
## mean of x mean of y
## 6248.4565   30.9837
```

```
chisq.test(df$Confirmed,df$Recovered)
```

```
## Warning in chisq.test(df$Confirmed, df$Recovered): Chi-squared approximation may
## be incorrect
```

```
##
##  Pearson's Chi-squared test
##
## data:  df$Confirmed and df$Recovered
## X-squared = 230716, df = 199320, p-value < 2.2e-16
```

```
chisq.test(df$Deceased,df$Recovered)
```

```
## Warning in chisq.test(df$Deceased, df$Recovered): Chi-squared approximation may
## be incorrect
```

```
##
##  Pearson's Chi-squared test
##
## data:  df$Deceased and df$Recovered
## X-squared = 58982, df = 47520, p-value < 2.2e-16
```

```
chisq.test(df$Confirmed,df$Deceased)
```

```
## Warning in chisq.test(df$Confirmed, df$Deceased): Chi-squared approximation may
## be incorrect
```

```
##
##  Pearson's Chi-squared test
##
## data:  df$Confirmed and df$Deceased
## X-squared = 59095, df = 48924, p-value < 2.2e-16
```

```
class(df$Confirmed)
```

```
## [1] "numeric"
```

```
class(df$Recovered)
```

```
## [1] "numeric"
```

```
class(df$Deceased)
```

```
## [1] "numeric"
```

```
unclass(df$Confirmed)
```

```
##  [1]    0    0    0    1    1    0    0    0    0    0    0    0
## [13]    0    0    0    0    0    0    0    0    0    0    0    0
## [25]    0    0    0    0    0    0    0    0    0    0    0    0
## [37]    0    0    0    6    8    0    2    3    0    2    3    0
## [49]    0    1   12   12   15   28   14    9   19   39    6   20
## [61]   32    7   24   21    9   11    8   13    8    9   12    7
```

```
## [73]     10     2     3     8     1     7     1     4     2     6    19    11
## [85]     10     3     7    11    13     4    10     2     0     2     0     0
## [97]      3     0     0     1     2     7     7     5    10    26    16    11
## [109]    14    29    12    24    24    42    62    53    49    67    40    85
## [121]    62    58    61    57    86    82    94   111   108   107    91    91
## [133]    65    83    78    85    54    82    79    75    97   118   127   133
## [145]   138   141   152   123   150   195   118   122   131   151   160   211
## [157]   240   225   193   272   301   339   416   488   435   449   608   623
## [169]   722   791   593   821   794   720  1038  1078   885  1103   927   702
## [181]  1167   903   506  1310  1129  1169   962  1083  1195  1298  1251  1420
## [193]  1211  1184  1417  1212  1564  1569  1608  1530  1725  1758  2333  1968
## [205]  1983  2172  1908  1242  2375  2476  2406  2543  2397  2154  1530  1140
## [217]  1547  1553  2479  2655  3082  1648  3026  3402  3349  2988  2885  3139
## [229]  2540  3215  3830  4351  4167  4644  4696  2910  4125  5376  6324  6477
## [241]  7006  7445  4538  7354  8830  8135  9258  7834  8553  5042  7871 10606
## [253]  5445  9250 11755  9347  5930  8764  6244  7789  7283  9016  7631  5022
## [265]  6591  8369  7482  8511  8253  6843  4287  5457  8790  7020  6638  7983
## [277]  7025  4138  6862  8516  6820  7002  7201  5440  3593  6010  7007  5537
## [289]  5804  6357  4581  2710  5792  6419  5722  6028  5772  5254  3757  5420
## [301]  6491  5378  3966  6250  5643  3382  5375  6316  5376  5718  5848  4777
## [313]  3272  5032  4875  4470  4642  5949  4698  2707  5218  6185  4969  5456
## [325]  6293  5711  3423  6049  6169  5177  5397  3527  4905  3047  5887  6268
## [337]  5215  4991  5328  4600  3021  5615  6394  5051  5142  5528  4545  3110
## [349]  5507  6004  5490  5624  5960  5005  3346  6186  6815  6334  6753  6960
## [361]  6036  3361  6293  5659  5771  6268  6282  5266  3459  5716  6356  6102
## [373]  5610  5942  6075  3742  5214  5980  5281  5397  5471  4612  2884  4937
## [385]  4892  4584  4505  4650  4070  2212  4034  4106  3677  3671  3792  3254
## [397]  1938  2938  2765  2616  2776  2791  2100  1412  2316  2475  2133  1780
## [409]  2035  1792  1054  1970  2098  1899  1984  2078  1875  1239  1985  2456
## [421]  1989  1825  2055  2216  1549  2389  2653  2798  2508  2541  2802  2357
## [433]  3502  3502  4353  5063  6194  6986  5692  7515  8778  8126 10031 13835
## [445] 18257 13644 19577 22414 26995 28447 26685 28469 21890 32819 35013 38607
## [457] 37199 35636 31959 26011 37190 41953 42464 38460 41971 35801 27487 37290
## [469] 43529 39955 34694 32680 29704 21402 31337 32762 30491 29673 28514 25820
## [481] 17821 29803 28798 24166 22318 23513 19894 12300 19760 19661 18853 16229
## [493] 17328 14672  9313 15567 16204 14424 14233 13832 11584  7719 12246 13270
## [505] 12469 11361 12443 11647  7449 12617 12787 12078 11546 12118 10905  8063
## [517] 13550 13658 12868 12095 12456 12100  8037 14373 15600 13772 13563 14087
## [529] 12220  7798 14539 15637 13773 13750 16148 13956  9931 16848 17481 12818
## [541] 17518 18531 17466 11586 22129 22056 22064 20772 20624 20728 13984 23676
```

```r
inherits(df$Confirmed,what = 'A',which=FALSE)
```

```
## [1] FALSE
```

```r
oldClass(df$Confirmed)
```

```
## NULL
```

```r
str(df$Confirmed)
```

```
##  num [1:552] 0 0 0 1 1 0 0 0 0 0 ...
```

```r
str(df$Recovered)
```

```
##  num [1:552] 0 0 0 0 0 0 0 0 0 0 ...
```

```r
str(df$Deceased)
```

```
##  num [1:552] 0 0 0 0 0 0 0 0 0 0 ...
```

```r
sum(df$Confirmed)
```

```
## [1] 3449148
```

```r
sum(df$Recovered)
```

```
## [1] 3258648
```

```r
sum(df$Deceased)
```

```
## [1] 17103
```

```r
diff(df$Confirmed)
```

```
##   [1]     0     0     1     0    -1     0     0     0     0     0     0     0
##  [13]     0     0     0     0     0     0     0     0     0     0     0     0
##  [25]     0     0     0     0     0     0     0     0     0     0     0     0
##  [37]     0     0     6     2    -8     2     1    -3     2     1    -3     0
##  [49]     1    11     0     3    13   -14    -5    10    20   -33    14    12
##  [61]   -25    17    -3   -12     2    -3     5    -5     1     3    -5     3
##  [73]    -8     1     5    -7     6    -6     3    -2     4    13    -8    -1
##  [85]    -7     4     4     2    -9     6    -8    -2     2    -2     0     3
##  [97]    -3     0     1     1     5     0    -2     5    16   -10    -5     3
## [109]    15   -17    12     0    18    20    -9    -4    18   -27    45   -23
## [121]    -4     3    -4    29    -4    12    17    -3    -1   -16     0   -26
## [133]    18    -5     7   -31    28    -3    -4    22    21     9     6     5
## [145]     3    11   -29    27    45   -77     4     9    20     9    51    29
## [157]   -15   -32    79    29    38    77    72   -53    14   159    15    99
## [169]    69  -198   228   -27   -74   318    40  -193   218  -176  -225   465
## [181]  -264  -397   804  -181    40  -207   121   112   103   -47   169  -209
## [193]   -27   233  -205   352     5    39   -78   195    33   575  -365    15
## [205]   189  -264  -666  1133   101   -70   137  -146  -243  -624  -390   407
## [217]     6   926   176   427 -1434  1378   376   -53  -361  -103   254  -599
## [229]   675   615   521  -184   477    52 -1786  1215  1251   948   153   529
## [241]   439 -2907  2816  1476  -695  1123 -1424   719 -3511  2829  2735 -5161
## [253]  3805  2505 -2408 -3417  2834 -2520  1545  -506  1733 -1385 -2609  1569
## [265]  1778  -887  1029  -258 -1410 -2556  1170  3333 -1770  -382  1345  -958
## [277] -2887  2724  1654 -1696   182   199 -1761 -1847  2417   997 -1470   267
## [289]   553 -1776 -1871  3082   627  -697   306  -256  -518 -1497  1663  1071
## [301] -1113 -1412  2284  -607 -2261  1993   941  -940   342   130 -1071 -1505
## [313]  1760  -157  -405   172  1307 -1251 -1991  2511   967 -1216   487   837
## [325]  -582 -2288  2626   120  -992   220 -1870  1378 -1858  2840   381 -1053
## [337]  -224   337  -728 -1579  2594   779 -1343    91   386  -983 -1435  2397
## [349]   497  -514   134   336  -955 -1659  2840   629  -481   419   207  -924
## [361] -2675  2932  -634   112   497    14 -1016 -1807  2257   640  -254  -492
## [373]   332   133 -2333  1472   766  -699   116    74  -859 -1728  2053   -45
## [385]  -308   -79   145  -580 -1858  1822    72  -429    -6   121  -538 -1316
## [397]  1000  -173  -149   160    15  -691  -688   904   159  -342  -353   255
## [409]  -243  -738   916   128  -199    85    94  -203  -636   746   471  -467
## [421]  -164   230   161  -667   840   264   145  -290    33   261  -445  1145
## [433]     0   851   710  1131   792 -1294  1823  1263  -652  1905  3804  4422
## [445] -4613  5933  2837  4581  1452 -1762  1784 -6579 10929  2194  3594 -1408
## [457] -1563 -3677 -5948 11179  4763   511 -4004  3511 -6170 -8314  9803  6239
```

```
## [469] -3574 -5261 -2014 -2976 -8302  9935  1425 -2271  -818 -1159 -2694 -7999
## [481] 11982 -1005 -4632 -1848  1195 -3619 -7594  7460   -99  -808 -2624  1099
## [493] -2656 -5359  6254   637 -1780  -191  -401 -2248 -3865  4527  1024  -801
## [505] -1108  1082  -796 -4198  5168   170  -709  -532   572 -1213 -2842  5487
## [517]   108  -790  -773   361  -356 -4063  6336  1227 -1828  -209   524 -1867
## [529] -4422  6741  1098 -1864   -23  2398 -2192 -4025  6917   633 -4663  4700
## [541]  1013 -1065 -5880 10543   -73     8 -1292  -148   104 -6744  9692
```

diff(df$Recovered)

```
##   [1]     0     0     0     0     0     0     0     0     0     0
##  [11]     0     0     0     0     0     0     0     0     0     0
##  [21]     0     0     0     0     0     0     0     0     0     0
##  [31]     0     0     0     0     0     0     0     0     0     0
##  [41]     0     0     0     0     0     0     0     0     0     0
##  [51]     0     0     0     0     0     0     3     5    -4    -4
##  [61]     4    -2     0    12    -6    -2    -3     9     1     0
##  [71]    14    -8    17   -17    -6    -6    20   -17    -8    11
##  [81]     8    -5   -15     7     7    -8    -3     9    -9     6
##  [91]     4    -5    -1    -7    60   -61     7    -2     5    -9
## [101]     3    -4     0     1     2    -3     4    -4     0     0
## [111]     5     3    -6     1     2     7    -2     0    -7     7
## [121]     0     5     3     1     5    15   -17    28    -9   -30
## [131]    23    23     5   -30    14    10    17   -13    30    -1
## [141]     7   -39    36    -5   -28    21   -28    12    37   -60
## [151]    37    -4    57    70    -1     8   -83    41   -54    -8
## [161]    44   -37    31   -11    30    19    15    32   -95    71
## [171]   -32    73    29    -2   160   536    81  -360    56   -66
## [181]   -34   145    74  -112   -64   127   206   213  -434    14
## [191]   901  -745  -186   642  -546  -114   538  -501   296    32
## [201]   234  -148     0   202  -127  -182   128   218  -105   716
## [211]    30   128  -459   -73   418    18  -179   766  -605    85
## [221]    50  -384   196  -401  -331   618   -89   255   422  -269
## [231]   474     7   118  -111   275   -19   -56   217   313  -282
## [241]   192   -44    73   116  -708  1264   384   375  -211   341
## [251]  1180   842  1045  -478  1354 -1088  -113    69  -710  -315
## [261]  1224   419  -941   -94  -536   754 -1475   350  1181  -542
## [271]   -92   645   814  -646  -498  1181 -1403  1694  -596  -507
## [281]   155  -734  -267  -870   715   554 -1133    82   592  -109
## [291]  -117    53   446  -206  -462   321  -492  -802  -276   621
## [301]   200 -1426   731   586   194    96  -227  -334   -94   324
## [311]  -603  -512    30   -88   200   -99   520   -10  -777   585
## [321]   662  -758  -269    48  -278    23   563  -249    -7  -295
## [331]  -724  -319   709   857   678  -331  -265  -126  -317   477
## [341]  -223   188   529  -315   100  -765  -737   348   888  -821
## [351]   266   408  -603  -487   375  3068 -1135  -121  -825  -110
## [361]   433  -316  -284   588   804   634 -1302  -515   532   633
## [371]   -39   312  -475  -230    11   516  -730   -53  -360   503
## [381] -1143   381   366  -607   361  -339   987 -1496   692  -214
## [391]  1062 -1233  -510   508  -317  -858    37   519   125  -518
## [401]  -121   522 -1009  1356  -194  -439  -376  -121   -18   225
## [411]  -579   -69  -696  -154   246    40  -485   406  -112  -195
## [421]    52   167  -231    44    49    93  -204   452  -627   513
## [431]  -307    32    57   250   270   109  -226   116   485  -317
## [441]    58  1092  -138   911  -260  -425  1551   939  -707  1404
```

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```
## [451]    1055    -179   10470   -2908    5611   -3616   -2007     803    3223    6629
## [461]   -3042    4046    -490     794    1862    1891    1769    1622    -867   -2414
## [471]   -1877    4854   65355  -53725    2487   -4044   -3337    4368   -8084   -1277
## [481]   -2642    2128   -4986   -4269    1830     913    -146   -4750    5591   -3139
## [491]    -709   -1857   -2574     492   -1902     218   -2243   -2639    2817    -316
## [501]   -1113   -3207    2153   -2075   -1467     998    -686    1137   -1866    1953
## [511]   -2214    -413      68    1227    -822   -1246    1525    -244   -1321    2272
## [521]    -964    -205    -595     878    -215    -960    1413     635   -1055   -1116
## [531]    2643    -604   -1673    2500     759    -750   -1154    2079    -677   -2387
## [541]    4440    -260    -335   -1497    4346   -1112   -1998    2214     927   -1869
## [551]    -297
```

diff(df$Deceased)

```
##   [1]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
##  [19]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
##  [37]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
##  [55]    0    0    0    1   -1    0    1   -1    0    0    0    0    0    0    0    0    0    0
##  [73]    0    0    0    0    0    0    0    0    0    0    0    0    1   -1    0    0    0    0
##  [91]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
## [109]    0    0    0    0    1   -1    1    0   -1    0    1    0    0    0   -1    1   -1    3
## [127]   -3    1   -1    1   -1    1    0    0   -1    0    1   -1    0    1   -1    0    0    0
## [145]    1   -1    0    0    0    0    1    0    0   -1    0    0    0    2   -2    0    0    0
## [163]    2    0    0   -1    0    1   -1    1    0   -1    0    0    4   -1    1   -3    0    2
## [181]   -3    1    1    5   -7    1    1    4   -4    2   -1   -2    5   -2    1   -3    7   -3
## [199]    3    3   -7    1    2    3    3  -10    6   -1    3   -3   -3   -1    1    0   -3    3
## [217]    3    1    0   -1    2    1   -1    0    2    1   -1    1   -3    2   -5    3    6   -2
## [235]    2    1    1    1    1   -1    0   -1    2    1    6   -9    2    1    0    2   -3    2
## [253]    1   -2    2   -3   -1   -1    3    1    2   -4   -1    3    2   -3    3   -1    1   -6
## [271]    4    3   -1    2   -1    1   -7    5    2   -2    1    1   -4   -2    6    1   -4    1
## [289]    0   -5   -2    8    1   -2    2   -3    2   -5    2    2    1   -4    2    2   -6    5
## [307]    2    3   -2    3   -4   -5    8    4   -9    3    3   -3   -5    9   -6    0   -4    6
## [325]    1   -3    0   -5    0   -6    5    4  -11   10    4    2   -7   -2    4   -6    5    1
## [343]    0   -2   -1    1   -3    5    1   -7    4    4   -6   -4    9   -8    3   -2    4   -3
## [361]   -3    2    1   -1    3   -4    3   -4   -1    4   -3    2   -3    3   -3    3   -1   -2
## [379]    2   -2   -1   -2    5   -2   -2    1   -2    2    1   -2    3   -3    0    4   -3   -2
## [397]    3   -1   -1    2    0   -3   -1    4   -2   -1    1   -2    3   -4    4   -2    2    2
## [415]   -2   -2   -1   -2    0    2    2    0   -2   -1    5   -1   -4    3   -2   -2    2    2
## [433]    2    2    4   -5   -1   -5    9    2   -2    1    6   -2   -4    7   -6    6   -1   -2
## [451]    5   -2    4    9    7    1   -1    1   -4   12    1    5   -9   10    4   -3   14   16
## [469]    2   -4    3   -7   -2   10   15   16   14   34   12    8  -19  -26   30   13    4  -12
## [487]  -12   20   19  -60  -18   74   18  -16  -87   32   38  -21   -2   35  -45    5  -19  -59
## [505]    2   25   -3  -18   47    9  -14  -18    0  -56   48   -6   38  -18   22  -11  -59   26
## [523]   40    6   -6  -12  -21  -12    3   24    4  -41   43  -16  -33  -23   46    1   17   10
## [541]  -34  -32   69   21  -25   -3  -12  -36  -24   62   30
```

fivenum(df$Confirmed)

```
## [1]     0   102  3355  7113 43529
```

fivenum(df$Recovered)

```
## [1]     0.0    58.5  3362.0  6743.0 99651.0
```

fivenum(df$Deceased)

```
## [1]    0.0    0.0   15.5   27.0  227.0
```

```
table(df$Confirmed)
```

```
## 
##    0    1    2    3    4    5    6    7    8    9   10   11   12
##   46    6    7    5    2    1    3    6    4    3    4    4    4
##   13   14   15   16   19   20   21   24   26   28   29   32   39
##    2    2    1    1    2    1    1    3    1    1    1    1    1
##   40   42   49   53   54   57   58   61   62   65   67   75   78
##    1    1    1    1    1    1    1    1    2    1    1    1    1
##   79   82   83   85   86   91   94   97  107  108  111  118  122
##    1    2    1    2    1    2    1    1    1    1    1    2    1
##  123  127  131  133  138  141  150  151  152  160  193  195  211
##    1    1    1    1    1    1    1    1    1    1    1    1    1
##  225  240  272  301  339  416  435  449  488  506  593  608  623
##    1    1    1    1    1    1    1    1    1    1    1    1    1
##  702  720  722  791  794  821  885  903  927  962 1038 1054 1078
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 1083 1103 1129 1140 1167 1169 1184 1195 1211 1212 1239 1242 1251
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 1298 1310 1412 1417 1420 1530 1547 1549 1553 1564 1569 1608 1648
##    1    1    1    1    1    2    1    1    1    1    1    1    1
## 1725 1758 1780 1792 1825 1875 1899 1908 1938 1968 1970 1983 1984
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 1985 1989 2035 2055 2078 2098 2100 2133 2154 2172 2212 2216 2316
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 2333 2357 2375 2389 2397 2406 2456 2475 2476 2479 2508 2540 2541
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 2543 2616 2653 2655 2707 2710 2765 2776 2791 2798 2802 2884 2885
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 2910 2938 2988 3021 3026 3047 3082 3110 3139 3215 3254 3272 3346
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 3349 3361 3382 3402 3423 3459 3502 3527 3593 3671 3677 3742 3757
##    1    1    1    1    1    1    2    1    1    1    1    1    1
## 3792 3830 3966 4034 4070 4106 4125 4138 4167 4287 4351 4353 4470
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 4505 4538 4545 4581 4584 4600 4612 4642 4644 4650 4696 4698 4777
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 4875 4892 4905 4937 4969 4991 5005 5022 5032 5042 5051 5063 5142
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 5177 5214 5215 5218 5254 5266 5281 5328 5375 5376 5378 5397 5420
##    1    1    1    1    1    1    1    1    1    2    1    2    1
## 5440 5445 5456 5457 5471 5490 5507 5528 5537 5610 5615 5624 5643
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 5659 5692 5711 5716 5718 5722 5771 5772 5792 5804 5848 5887 5930
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 5942 5949 5960 5980 6004 6010 6028 6036 6049 6075 6102 6169 6185
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 6186 6194 6244 6250 6268 6282 6293 6316 6324 6334 6356 6357 6394
##    1    1    1    1    2    1    2    1    1    1    1    1    1
## 6419 6477 6491 6591 6638 6753 6815 6820 6843 6862 6960 6986 7002
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 7006 7007 7020 7025 7201 7283 7354 7445 7449 7482 7515 7631 7719
##    1    1    1    1    1    1    1    1    1    1    1    1    1
## 7789 7798 7834 7871 7983 8037 8063 8126 8135 8253 8369 8511 8516
```

```
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  8553  8764  8778  8790  8830  9016  9250  9258  9313  9347  9931 10031 10606
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 10905 11361 11546 11584 11586 11647 11755 12078 12095 12100 12118 12220 12246
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 12300 12443 12456 12469 12617 12787 12818 12868 13270 13550 13563 13644 13658
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 13750 13772 13773 13832 13835 13956 13984 14087 14233 14373 14424 14539 14672
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 15567 15600 15637 16148 16204 16229 16848 17328 17466 17481 17518 17821 18257
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 18531 18853 19577 19661 19760 19894 20624 20728 20772 21402 21890 22056 22064
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 22129 22318 22414 23513 23676 24166 25820 26011 26685 26995 27487 28447 28469
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 28514 28798 29673 29704 29803 30491 31337 31959 32680 32762 32819 34694 35013
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 35636 35801 37190 37199 37290 38460 38607 39955 41953 41971 42464 43529
##     1     1     1     1     1     1     1     1     1     1     1     1
```

table(df$Recovered)

```
##
##     0     1     2     3     4     5     6     7     8     9    10    11    12
##    65     4     4     5     6     3     1     3     5     1     7     1     2
##    13    14    15    16    18    19    21    22    24    27    32    34    36
##     5     2     2     1     1     3     1     1     1     2     1     1     1
##    39    41    42    46    50    53    56    57    60    61    62    65    73
##     1     1     1     1     1     1     1     2     2     1     1     1     1
##    75    79    81    88    89    90    93    96   102   105   112   113   126
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##   132   133   143   149   162   167   172   181   196   201   202   204   209
##     2     1     1     1     1     1     1     1     1     1     1     1     1
##   228   245   272   274   432   645   679   688   689   745   752   766   784
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##   790   800   803   814   815   864   880   968   970  1021  1049  1099  1110
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  1131  1217  1234  1238  1292  1304  1326  1351  1365  1419  1426  1456  1657
##     1     2     1     1     1     1     1     1     1     1     1     1     1
##  1660  1693  1715  1766  1835  1853  1855  1862  1865  1866  1897  1898  1917
##     1     1     1     2     1     1     1     1     1     1     1     1     1
##  1944  1946  1950  1955  1965  2039  2058  2060  2067  2084  2097  2110  2111
##     1     1     1     1     1     1     1     1     1     1     1     1     2
##  2119  2129  2172  2173  2196  2205  2211  2225  2246  2251  2263  2287  2358
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  2474  2475  2532  2584  2642  2700  2716  2737  2744  2751  2815  2828  2862
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  2884  2951  2959  3007  3026  3030  3168  3199  3238  3256  3347  3377  3391
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  3420  3463  3475  3481  3512  3517  3536  3638  3654  3753  3782  3792  3880
##     1     2     1     1     1     1     1     1     1     1     1     1     1
##  3921  3922  4031  4039  4092  4142  4156  4172  4192  4270  4296  4305  4333
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  4337  4345  4386  4408  4471  4476  4481  4494  4506  4544  4565  4603  4640
##     1     1     1     1     1     1     1     1     1     1     1     1     1
```

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```
##  4647  4650  4652  4659  4668  4692  4701  4705  4735  4748  4749  4801  4808
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  4823  4832  4847  4851  4854  4922  4970  4981  4985  5006  5011  5029  5037
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  5057  5066  5073  5110  5111  5145  5149  5158  5173  5193  5215  5217  5258
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  5268  5275  5283  5290  5324  5332  5376  5424  5425  5431  5439  5496  5590
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  5594  5606  5639  5663  5692  5707  5728  5730  5745  5747  5770  5820  5835
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  5841  5861  5885  5924  5948  5959  5970  5983  6055  6108  6118  6119  6151
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  6161  6178  6201  6227  6229  6341  6370  6380  6398  6468  6475  6567  6620
##     1     1     1     1     1     1     1     1     2     1     1     1     1
##  6653  6684  6698  6719  6767  6793  6839  6853  6860  7003  7015  7032  7066
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  7067  7082  7107  7108  7120  7252  7330  7364  7375  7469  7570  7593  7649
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  7660  7699  7723  7792  7828  7836  7854  7943  7991  8048  8122  8206  8410
##     1     1     1     1     1     1     1     1     1     1     1     1     1
##  8474  8511  8802  8924 10243 10283 10331 10454 10697 10751 11056 11067 11124
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 11346 11414 11447 11469 11529 11551 11564 11629 11730 11808 11867 12052 12147
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 12351 12370 12459 12502 12515 12974 13145 13197 13206 13415 13454 13536 13596
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 13614 13683 13956 14131 14651 14912 15247 15355 15493 15505 15507 15626 15689
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 15923 16296 16649 16743 16865 17500 17761 17792 17856 17994 18172 18413 19519
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 20019 20237 21116 21429 21921 23106 24003 24117 25860 26148 26270 26569 26662
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 27152 27456 28100 28867 29013 29318 29442 29708 30539 31209 31319 32978 33397
##     1     1     1     1     1     1     1     1     1     1     1     1     1
## 33733 34296 34600 35525 36039 37316 41032 44369 45400 45926 48413 99651
##     1     1     1     1     1     1     1     1     1     1     1     1
```

```
table(df$Deceased)
```

```
##
##   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19
## 139  30  12   5   4   5   3   8   1   2   9   7  13  10  15  13  16   7   9  10
##  20  21  22  23  24  25  26  27  28  29  30  31  32  33  35  41  45  48  49  54
##  11  15  15  14   9  14  15  14  13   6   3   2   3   1   1   1   1   2   2   1
##  56  57  58  62  63  64  65  66  68  76  79  80  81  87  88  89  90  93  94  95
##   1   1   2   1   1   1   1   1   1   1   1   1   1   2   1   1   1   1   1   1
##  96  97  98 100 102 104 105 109 110 112 114 115 116 118 122 124 128 130 131 132
##   1   3   1   1   1   2   1   1   1   2   1   1   1   3   1   3   3   2   1   1
## 135 136 141 142 146 147 148 150 151 153 156 161 166 171 173 174 176 177 181 186
##   3   1   1   4   1   1   2   1   1   1   2   1   1   1   1   1   1   1   1   1
## 188 194 196 198 206 209 211 213 227
##   1   3   1   1   1   1   1   1   1
```

```
scale(df$Confirmed,scale=T)
```

```
##                    [,1]
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##    [3,] -0.7251347133
##    [4,] -0.7250186631
##    [5,] -0.7250186631
##    [6,] -0.7251347133
##    [7,] -0.7251347133
##    [8,] -0.7251347133
##    [9,] -0.7251347133
##   [10,] -0.7251347133
##   [11,] -0.7251347133
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##   [43,] -0.7249026128
##   [44,] -0.7247865626
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##   [46,] -0.7249026128
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##   [51,] -0.7237421107
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##   [53,] -0.7233939601
##   [54,] -0.7218853073
```

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##   [57,] -0.7229297592
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##   [60,] -0.7228137090
##   [61,] -0.7214211064
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##   [64,] -0.7226976588
##   [65,] -0.7240902614
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##   [68,] -0.7236260605
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## [267,]  0.1431529840
## [268,]  0.2625686537
## [269,]  0.2326276986
## [270,]  0.0689968976
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## [275,]  0.0452066038
## [276,]  0.2012941409
## [277,]  0.0901180364
## [278,] -0.2449189299
## [279,]  0.0712018516
## [280,]  0.2631489047
## [281,]  0.0663277427
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## [524,]   0.9428550051
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## [526,]   0.8731088268
## [527,]   0.8488543322
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## [530,]   0.1798248515
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## [532,]   1.0895424749
## [533,]   0.8732248770
## [534,]   0.8705557221
## [535,]   1.1488441340
## [536,]   0.8944620661
## [537,]   0.4273599568
## [538,]   1.2300792835
## [539,]   1.3035390686
## [540,]   0.7623969231
```

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## [545,]  1.8429404609
## [546,]  1.8344687953
## [547,]  1.8353971970
## [548,]  1.6854603212
## [549,]  1.6682848896
## [550,]  1.6803541118
## [551,]  0.8977114720
## [552,]  2.0224701411
## attr(,"scaled:center")
## [1] 6248.457
## attr(,"scaled:scale")
## [1] 8616.96
```

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scale(df$Recovered,scale=T)
```

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## [69,] -0.648352249
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## [304,] -0.069150683
## [305,] -0.004660446
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## [537,]   0.5700042647
## [538,]   1.5405365713
## [539,]   1.5616350997
## [540,]   1.9203100826
## [541,]   2.1312953666
## [542,]   1.4139454008
## [543,]   0.7387924919
## [544,]   2.1945909518
## [545,]   2.6376600483
## [546,]   2.1101968382
## [547,]   2.0469012530
## [548,]   1.7937189121
## [549,]   1.0341718896
## [550,]   0.5278072079
## [551,]   1.8359159689
## [552,]   2.4688718211
## attr(,"scaled:center")
## [1] 30.9837
## attr(,"scaled:scale")
## [1] 47.39667
```

```
length(df$Confirmed)
```

```
## [1] 552
```

```
length(df$Recovered)
```

```
## [1] 552
```

```
length(df$Deceased)
```

```
## [1] 552
```

```
rep(df$Confirmed)
```

```
##   [1]     0     0     0     1     1     0     0     0     0     0     0     0
##  [13]     0     0     0     0     0     0     0     0     0     0     0     0
##  [25]     0     0     0     0     0     0     0     0     0     0     0     0
##  [37]     0     0     0     6     8     0     2     3     0     2     3     0
##  [49]     0     1    12    12    15    28    14     9    19    39     6    20
##  [61]    32     7    24    21     9    11     8    13     8     9    12     7
##  [73]    10     2     3     8     1     7     1     4     2     6    19    11
##  [85]    10     3     7    11    13     4    10     2     0     2     0     0
##  [97]     3     0     0     1     2     7     7     5    10    26    16    11
## [109]    14    29    12    24    24    42    62    53    49    67    40    85
## [121]    62    58    61    57    86    82    94   111   108   107    91    91
## [133]    65    83    78    85    54    82    79    75    97   118   127   133
## [145]   138   141   152   123   150   195   118   122   131   151   160   211
## [157]   240   225   193   272   301   339   416   488   435   449   608   623
## [169]   722   791   593   821   794   720  1038  1078   885  1103   927   702
## [181]  1167   903   506  1310  1129  1169   962  1083  1195  1298  1251  1420
## [193]  1211  1184  1417  1212  1564  1569  1608  1530  1725  1758  2333  1968
## [205]  1983  2172  1908  1242  2375  2476  2406  2543  2397  2154  1530  1140
## [217]  1547  1553  2479  2655  3082  1648  3026  3402  3349  2988  2885  3139
## [229]  2540  3215  3830  4351  4167  4644  4696  2910  4125  5376  6324  6477
## [241]  7006  7445  4538  7354  8830  8135  9258  7834  8553  5042  7871 10606
## [253]  5445  9250 11755  9347  5930  8764  6244  7789  7283  9016  7631  5022
## [265]  6591  8369  7482  8511  8253  6843  4287  5457  8790  7020  6638  7983
## [277]  7025  4138  6862  8516  6820  7002  7201  5440  3593  6010  7007  5537
## [289]  5804  6357  4581  2710  5792  6419  5722  6028  5772  5254  3757  5420
## [301]  6491  5378  3966  6250  5643  3382  5375  6316  5376  5718  5848  4777
## [313]  3272  5032  4875  4470  4642  5949  4698  2707  5218  6185  4969  5456
## [325]  6293  5711  3423  6049  6169  5177  5397  3527  4905  3047  5887  6268
## [337]  5215  4991  5328  4600  3021  5615  6394  5051  5142  5528  4545  3110
## [349]  5507  6004  5490  5624  5960  5005  3346  6186  6815  6334  6753  6960
## [361]  6036  3361  6293  5659  5771  6268  6282  5266  3459  5716  6356  6102
## [373]  5610  5942  6075  3742  5214  5980  5281  5397  5471  4612  2884  4937
## [385]  4892  4584  4505  4650  4070  2212  4034  4106  3677  3671  3792  3254
## [397]  1938  2938  2765  2616  2776  2791  2100  1412  2316  2475  2133  1780
## [409]  2035  1792  1054  1970  2098  1899  1984  2078  1875  1239  1985  2456
## [421]  1989  1825  2055  2216  1549  2389  2653  2798  2508  2541  2802  2357
## [433]  3502  3502  4353  5063  6194  6986  5692  7515  8778  8126 10031 13835
## [445] 18257 13644 19577 22414 26995 28447 26685 28469 21890 32819 35013 38607
## [457] 37199 35636 31959 26011 37190 41953 42464 38460 41971 35801 27487 37290
## [469] 43529 39955 34694 32680 29704 21402 31337 32762 30491 29673 28514 25820
## [481] 17821 29803 28798 24166 22318 23513 19894 12300 19760 19661 18853 16229
## [493] 17328 14672  9313 15567 16204 14424 14233 13832 11584  7719 12246 13270
```

```
## [505] 12469 11361 12443 11647  7449 12617 12787 12078 11546 12118 10905  8063
## [517] 13550 13658 12868 12095 12456 12100  8037 14373 15600 13772 13563 14087
## [529] 12220  7798 14539 15637 13773 13750 16148 13956  9931 16848 17481 12818
## [541] 17518 18531 17466 11586 22129 22056 22064 20772 20624 20728 13984 23676
```

```
rep(df$Deceased)
```

```
##   [1]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [55]   0   0   0   0   1   0   0   1   0   0   0   0   0   0   0   0   0   0
##  [73]   0   0   0   0   0   0   0   0   0   0   0   0   0   1   0   0   0   0
##  [91]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## [109]   0   0   0   0   0   1   0   1   1   0   0   1   1   1   1   0   1   0
## [127]   3   0   1   0   1   0   1   1   1   0   0   1   0   0   1   0   0   0
## [145]   0   1   0   0   0   0   0   1   1   1   0   0   0   0   2   0   0   0
## [163]   0   2   2   2   1   1   2   1   2   2   1   1   1   5   4   5   2   2
## [181]   4   1   2   3   8   1   2   3   7   3   5   4   2   7   5   6   3  10
## [199]   7  10  13   6   7   9  12  15   5  11  10  13  10   7   6   7   7   4
## [217]   7  10  11  11  10  12  13  12  12  14  15  14  15  12  14   9  12  18
## [235]  16  18  19  20  21  22  21  21  20  22  23  29  20  22  23  23  25  22
## [253]  24  25  23  25  22  21  20  23  24  26  22  21  24  26  23  26  25  26
## [271]  20  24  27  26  28  27  28  21  26  28  26  27  28  24  22  28  29  25
## [289]  26  26  21  19  27  28  26  28  25  27  22  24  26  27  23  25  27  21
## [307]  26  28  31  29  32  28  23  31  35  26  29  32  29  24  33  27  27  23
## [325]  29  30  27  27  22  22  16  21  25  14  24  28  30  23  21  25  19  24
## [343]  25  25  23  22  23  20  25  26  19  23  27  21  17  26  18  21  19  23
## [361]  20  17  19  20  19  22  18  21  17  16  20  17  19  16  19  16  19  18
## [379]  16  18  16  15  13  18  16  14  15  13  15  16  14  17  14  14  18  15
## [397]  13  16  15  14  16  16  13  12  16  14  13  14  12  15  11  15  13  15
## [415]  17  15  13  12  10  10  12  14  14  12  11  16  15  11  14  12  10  12
## [433]  14  16  18  22  17  16  11  20  22  20  21  27  25  21  28  22  28  27
## [451]  25  30  28  32  41  48  49  48  49  45  57  58  63  54  64  68  65  79
## [469]  95  97  93  96  89  87  97 112 128 142 176 188 196 177 151 181 194 198
## [487] 186 174 194 213 153 135 209 227 211 124 156 194 173 171 206 161 166 147
## [505]  88  90 115 112  94 141 150 136 118 118  62 110 104 142 124 146 135  76
## [523] 102 142 148 142 130 109  97 100 124 128  87 130 114  81  58 104 105 122
## [541] 132  98  66 135 156 131 128 116  80  56 118 148
```

```
rep(df$Recovered)
```

```
##   [1]    0    0    0    0    0    0    0    0    0    0    0    0
##  [13]    0    0    0    0    0    0    0    0    0    0    0    0
##  [25]    0    0    0    0    0    0    0    0    0    0    0    0
##  [37]    0    0    0    0    0    0    0    0    0    0    0    0
##  [49]    0    0    0    0    0    0    0    0    0    3    8    4
##  [61]    0    4    2    2   14    8    6    3   12   13   13   27
##  [73]   19   36   19   13    7   27   10    2   13   21   16    1
##  [85]    8   15    7    4   13    4   10   14    9    8    1   61
##  [97]    0    7    5   10    1    4    0    0    1    3    0    4
## [109]    0    0    0    5    8    2    3    5   12   10   10    3
## [121]   10   10   15   18   19   24   39   22   50   41   11   34
## [133]   57   62   32   46   56   73   60   90   89   96   57   93
## [145]   88   60   81   53   65  102   42   79   75  132  202  201
## [157]  209  126  167  113  105  149  112  143  132  162  181  196
```

```
## [169]     228     133     204     172     245     274     272     432     968    1049     689     745
## [181]     679     645     790     864     752     688     815    1021    1234     800     814    1715
## [193]     970     784    1426     880     766    1304     803    1099    1131    1365    1217    1217
## [205]    1419    1292    1110    1238    1456    1351    2067    2097    2225    1766    1693    2111
## [217]    2129    1950    2716    2111    2196    2246    1862    2058    1657    1326    1944    1855
## [229]    2110    2532    2263    2737    2744    2862    2751    3026    3007    2951    3168    3481
## [241]    3199    3391    3347    3420    3536    2828    4092    4476    4851    4640    4981    6161
## [253]    7003    8048    7570    8924    7836    7723    7792    7082    6767    7991    8410    7469
## [265]    7375    6839    7593    6118    6468    7649    7107    7015    7660    8474    7828    7330
## [277]    8511    7108    8802    8206    7699    7854    7120    6853    5983    6698    7252    6119
## [289]    6201    6793    6684    6567    6620    7066    6860    6398    6719    6227    5425    5149
## [301]    5770    5970    4544    5275    5861    6055    6151    5924    5590    5496    5820    5217
## [313]    4705    4735    4647    4847    4748    5268    5258    4481    5066    5728    4970    4701
## [325]    4749    4471    4494    5057    4808    4801    4506    3782    3463    4172    5029    5707
## [337]    5376    5111    4985    4668    5145    4922    5110    5639    5324    5424    4659    3922
## [349]    4270    5158    4337    4603    5011    4408    3921    4296    7364    6229    6108    5283
## [361]    5173    5606    5290    5006    5594    6398    7032    5730    5215    5747    6380    6341
## [373]    6653    6178    5948    5959    6475    5745    5692    5332    5835    4692    5073    5439
## [385]    4832    5193    4854    5841    4345    5037    4823    5885    4652    4142    4650    4333
## [397]    3475    3512    4031    4156    3638    3517    4039    3030    4386    4192    3753    3377
## [409]    3256    3238    3463    2884    2815    2119    1965    2211    2251    1766    2172    2060
## [421]    1865    1917    2084    1853    1897    1946    2039    1835    2287    1660    2173    1866
## [433]    1898    1955    2205    2475    2584    2358    2474    2959    2642    2700    3792    3654
## [445]    4565    4305    3880    5431    6370    5663    7067    8122    7943   18413   15505   21116
## [457]   17500   15493   16296   19519   26148   23106   27152   26662   27456   29318   31209   32978
## [469]   34600   33733   31319   29442   34296   99651   45926   48413   44369   41032   45400   37316
## [481]   36039   33397   35525   30539   26270   28100   29013   28867   24117   29708   26569   25860
## [493]   24003   21429   21921   20019   20237   17994   15355   18172   17856   16743   13536   15689
## [505]   13614   12147   13145   12459   13596   11730   13683   11469   11056   11124   12351   11529
## [517]   10283   11808   11564   10243   12515   11551   11346   10751   11629   11414   10454   11867
## [529]   12502   11447   10331   12974   12370   10697   13197   13956   13206   12052   14131   13454
## [541]   11067   15507   15247   14912   13415   17761   16649   14651   16865   17792   15923   15626
```

```
ls(df)
```

```
## [1] "Confirmed" "Date"       "Deceased"  "Recovered"
```

```
dim(df)
```

```
## [1] 552   4
```

```
names(df)
```

```
## [1] "Date"       "Confirmed" "Recovered" "Deceased"
```

```
stem(df$Confirmed)
```

```
##
##   The decimal point is 3 digit(s) to the right of the |
##
##    0 | 00000000000000000000000000000000000000000000000000000000000000000+139
##    2 | 0000000111112222334444455555555677778888899990000111233334444555677
##    4 | 0011112344555566666677789999900000011122223333444444444555555556666777
##    6 | 000000011222223333333334444556688889000000002344455678889
##    8 | 00111345568888033339
##   10 | 069456668
##   12 | 11111223455688936667888888
```

```
##    14 | 00124457666
##    16 | 122835558
##    18 | 3596789
##    20 | 67849
##    22 | 1113457
##    24 | 28
##    26 | 0705
##    28 | 4558778
##    30 | 53
##    32 | 0788
##    34 | 7068
##    36 | 223
##    38 | 56
##    40 | 0
##    42 | 0055
```

```
stem(df$Recovered)
```

```
##
##   The decimal point is 4 digit(s) to the right of the |
##
##    0 | 000000000000000000000000000000000000000000000000000000000000000+233
##    0 | 5555555555555555555555555555555555555555555555555555555556666666666+60
##    1 | 0000111111111222222222222233333333444444
##    1 | 5555556666667778888888
##    2 | 000112344
##    2 | 666777789999
##    3 | 01113344
##    3 | 5667
##    4 | 14
##    4 | 568
##    5 |
##    5 |
##    6 |
##    6 |
##    7 |
##    7 |
##    8 |
##    8 |
##    9 |
##    9 |
##   10 | 0
```

```
stem(df$Deceased)
```

```
##
##   The decimal point is 1 digit(s) to the right of the |
##
##     0 | 0000000000000000000000000000000000000000000000000000000000000000+129
##     1 | 00000000011111112222222222222233333333333444444444444444455555555555556+29
##     2 | 000000000000111111111111111112222222222222222233333333333333334444444445555+46
##     3 | 0001122235
##     4 | 158899
##     5 | 46788
##     6 | 234568
##     7 | 69
```

```
##     8 | 017789
##     9 | 034567778
##    10 | 024459
##    11 | 022456888
##    12 | 2444888
##    13 | 00125556
##    14 | 122226788
##    15 | 01366
##    16 | 16
##    17 | 13467
##    18 | 168
##    19 | 44468
##    20 | 69
##    21 | 13
##    22 | 7
```

```
pnorm(df$Confirmed)
```

```
##   [1] 0.5000000 0.5000000 0.5000000 0.8413447 0.8413447 0.5000000 0.5000000
##   [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [36] 0.5000000 0.5000000 0.5000000 0.5000000 1.0000000 1.0000000 0.5000000
##  [43] 0.9772499 0.9986501 0.5000000 0.9772499 0.9986501 0.5000000 0.5000000
##  [50] 0.8413447 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [57] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [64] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [71] 1.0000000 1.0000000 1.0000000 0.9772499 0.9986501 1.0000000 0.8413447
##  [78] 1.0000000 0.8413447 0.9999683 0.9772499 1.0000000 1.0000000 1.0000000
##  [85] 1.0000000 0.9986501 1.0000000 1.0000000 1.0000000 0.9999683 1.0000000
##  [92] 0.9772499 0.5000000 0.9772499 0.5000000 0.5000000 0.9986501 0.5000000
##  [99] 0.5000000 0.8413447 0.9772499 1.0000000 1.0000000 0.9999997 1.0000000
## [106] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pnorm(df$Confirmed,mean=0,sd=1)
```

```
##    [1] 0.5000000 0.5000000 0.5000000 0.8413447 0.8413447 0.5000000 0.5000000
##    [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [36] 0.5000000 0.5000000 0.5000000 0.5000000 1.0000000 1.0000000 0.5000000
##   [43] 0.9772499 0.9986501 0.5000000 0.9772499 0.9986501 0.5000000 0.5000000
##   [50] 0.8413447 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##   [57] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##   [64] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
##  [71] 1.0000000 1.0000000 1.0000000 0.9772499 0.9986501 1.0000000 0.8413447
##  [78] 1.0000000 0.8413447 0.9999683 0.9772499 1.0000000 1.0000000 1.0000000
##  [85] 1.0000000 0.9986501 1.0000000 1.0000000 1.0000000 0.9999683 1.0000000
##  [92] 0.9772499 0.5000000 0.9772499 0.5000000 0.5000000 0.9986501 0.5000000
##  [99] 0.5000000 0.8413447 0.9772499 1.0000000 1.0000000 0.9999997 1.0000000
## [106] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
pnorm(df$Recovered)
```

```
##   [1] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [36] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [43] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [50] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [57] 0.5000000 0.9986501 1.0000000 0.9999683 0.5000000 0.9999683 0.9772499
##  [64] 0.9772499 1.0000000 1.0000000 1.0000000 0.9986501 1.0000000 1.0000000
##  [71] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [78] 1.0000000 1.0000000 0.9772499 1.0000000 1.0000000 1.0000000 0.8413447
##  [85] 1.0000000 1.0000000 1.0000000 0.9999683 1.0000000 0.9999683 1.0000000
##  [92] 1.0000000 1.0000000 1.0000000 0.8413447 1.0000000 0.5000000 1.0000000
##  [99] 0.9999997 1.0000000 0.8413447 0.9999683 0.5000000 0.5000000 0.8413447
## [106] 0.9986501 0.5000000 0.9999683 0.5000000 0.5000000 0.5000000 0.9999997
## [113] 1.0000000 0.9772499 0.9986501 0.9999997 1.0000000 1.0000000 1.0000000
## [120] 0.9986501 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
pnorm(df$Deceased)
```

```
##   [1] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [36] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [43] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [50] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [57] 0.5000000 0.5000000 0.8413447 0.5000000 0.5000000 0.8413447 0.5000000
##  [64] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
```

```
##   [71] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [78] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [85] 0.5000000 0.8413447 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [92] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [99] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [106] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [113] 0.5000000 0.8413447 0.5000000 0.8413447 0.8413447 0.5000000 0.5000000
##  [120] 0.8413447 0.8413447 0.8413447 0.8413447 0.5000000 0.8413447 0.5000000
##  [127] 0.9986501 0.5000000 0.8413447 0.5000000 0.8413447 0.5000000 0.8413447
##  [134] 0.8413447 0.8413447 0.5000000 0.5000000 0.8413447 0.5000000 0.5000000
##  [141] 0.8413447 0.5000000 0.5000000 0.5000000 0.5000000 0.8413447 0.5000000
##  [148] 0.5000000 0.5000000 0.5000000 0.5000000 0.8413447 0.8413447 0.8413447
##  [155] 0.5000000 0.5000000 0.5000000 0.5000000 0.9772499 0.5000000 0.5000000
##  [162] 0.5000000 0.5000000 0.9772499 0.9772499 0.9772499 0.8413447 0.8413447
##  [169] 0.9772499 0.8413447 0.9772499 0.9772499 0.8413447 0.8413447 0.8413447
##  [176] 0.9999997 0.9999683 0.9999997 0.9772499 0.9772499 0.9999683 0.8413447
##  [183] 0.9772499 0.9986501 1.0000000 0.8413447 0.9772499 0.9986501 1.0000000
##  [190] 0.9986501 0.9999997 0.9999683 0.9772499 1.0000000 0.9999997 1.0000000
##  [197] 0.9986501 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [204] 1.0000000 1.0000000 1.0000000 0.9999997 1.0000000 1.0000000 1.0000000
##  [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999683 1.0000000
##  [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
qnorm(df$Confirmed)
```

```
## Warning in qnorm(df$Confirmed): NaNs produced
```

```
##   [1] -Inf -Inf -Inf  Inf  Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [16] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [31] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  NaN  NaN -Inf  NaN  NaN -Inf
##  [46]  NaN  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [61]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [76]  NaN  Inf  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [91]  NaN  NaN -Inf  NaN -Inf -Inf  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN
## [106]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [121]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [136]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [151]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [166]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [181]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [196]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [211]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [226]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [241]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [256]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [271]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [286]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [301]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [316]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [331]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [346]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [361]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [376]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [391]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [406]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [421]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [436]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [451]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [466]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [481]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [496]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [511]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
```

```
## [526]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [541]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
```

```r
qnorm(df$Confirmed,mean=0,sd=1)
```

```
## Warning in qnorm(df$Confirmed, mean = 0, sd = 1): NaNs produced
```

```
##   [1] -Inf -Inf -Inf  Inf  Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [16] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [31] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  NaN  NaN -Inf  NaN  NaN -Inf
##  [46]  NaN  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [61]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [76]  NaN  Inf  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [91]  NaN  NaN -Inf  NaN -Inf -Inf  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN
## [106]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [121]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [136]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [151]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [166]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [181]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [196]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [211]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [226]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [241]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [256]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [271]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [286]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [301]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [316]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [331]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [346]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [361]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [376]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [391]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [406]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [421]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [436]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [451]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [466]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [481]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [496]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [511]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [526]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [541]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
```

```r
qnorm(df$Recovered)
```

```
## Warning in qnorm(df$Recovered): NaNs produced
```

```
##   [1] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [16] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [31] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [46] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  NaN  NaN  NaN
##  [61] -Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [76]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN
##  [91]  NaN  NaN  NaN  NaN  Inf  NaN -Inf  NaN  NaN  NaN  Inf  NaN -Inf -Inf  Inf
```

```
## [106]   NaN  -Inf   NaN  -Inf  -Inf  -Inf   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [121]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [136]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [151]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [166]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [181]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [196]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [211]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [226]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [241]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [256]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [271]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [286]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [301]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [316]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [331]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [346]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [361]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [376]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [391]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [406]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [421]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [436]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [451]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [466]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [481]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [496]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [511]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [526]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [541]   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
```

```
rnorm(df$Confirmed)
```

```
##   [1] -0.38506955 -1.06750655  0.75189291 -0.53696640  1.61324718  0.15652856
##   [7]  0.36307400  0.29337437 -0.56588333  1.65333346  0.51808572 -0.42617988
##  [13] -0.27657767 -0.70137838  0.37818430  1.36785861 -0.88405699  0.53431697
##  [19] -0.19444142  0.51410303  0.41233989 -0.83695557 -0.91538609  1.01575722
##  [25]  0.32122000  0.79569545  0.28132623 -0.11234603  0.72883860 -0.82548472
##  [31] -0.01436220 -0.22885480 -0.99647935 -0.67860406 -0.31319470  0.82672052
##  [37]  0.35919303  1.65062317  0.48437219 -0.03631686 -1.03011754 -1.10463130
##  [43] -0.33981736  1.52552013 -0.06088739  0.49604156  0.54422292 -0.90993552
##  [49]  0.01069162  1.38850945  0.38966649 -0.73288195  1.27915495 -0.03533862
##  [55]  1.68322041 -0.75523280 -1.09358889  0.79898479 -0.23434651 -0.13877310
##  [61] -0.73807282  0.51864920 -0.28626371  0.72975226 -0.87620624 -0.56382773
##  [67]  1.38275492  0.63943549 -0.35673573 -0.92232185 -0.48861932 -0.62471242
##  [73] -1.69582404  0.10542510  2.40185340 -0.95563340  0.49228154  0.98338724
##  [79] -0.70489149 -1.31730535 -1.14776092 -0.78097461  0.24115878 -0.16676147
##  [85]  1.77555947 -0.81903498 -1.11663245 -0.64457577  1.16690349  0.09061518
##  [91]  0.67645594  0.21600052  0.62329929  1.61625961 -1.79919860 -0.53092969
##  [97]  0.77100308  0.81962255 -0.54471239  0.22894590  0.40427561  1.37987312
## [103] -0.78958408  0.17406485  0.12777281 -0.59416559  2.41366200 -0.25231754
## [109] -0.67006172 -0.61585860 -0.88491943 -0.13461354  1.50241617 -0.13378867
## [115] -0.15050423  0.40743931 -0.03376185  1.24187804  1.33709246 -3.05054175
## [121]  0.47824690 -1.78019243  0.83143303  0.19471779 -0.01290578 -1.93123343
## [127]  1.02729202  0.52303205 -0.75484141  0.41677359 -1.04127909 -0.18714272
```

```
## [133]  2.66364343  0.92459439  1.68371748  0.52673507 -0.27118380  1.92565356
## [139] -1.63642672  1.21050418  0.94345125 -0.14365050 -0.28018569 -0.84837037
## [145]  0.59263017 -0.57728134  1.52619532 -0.46172892 -1.94093414 -1.20699059
## [151]  0.21540605  0.13037057  0.54372792  1.44797631 -0.05560933 -0.76531973
## [157] -0.06315009  0.85085968 -0.94119911 -0.01601036  0.96305540 -0.29490540
## [163]  0.48520009 -0.47684654  0.15776296  1.64358911  0.25882205  0.48062085
## [169] -0.89214486  0.49200348  0.98698740  0.66341294  0.43796901 -0.22406933
## [175]  0.39158047 -0.66440793 -1.29983116 -0.32126863  0.63677292  0.21515278
## [181] -1.16582139 -0.52178074  0.76683223 -0.85545346  0.29551133 -1.98776743
## [187] -0.47086728  1.07553915 -2.11272182  0.68812923  0.38406325 -0.21364537
## [193]  0.26401233 -0.08102055  0.52628637 -1.42754449  1.95584708 -0.71390770
## [199]  0.34602602 -0.36065671  0.24476680 -0.15536329 -1.35071579  0.15896059
## [205] -0.05691662  0.76311005  1.17466790 -1.26768699  0.02160932 -0.41208457
## [211] -0.26210714  2.03136484 -0.08713987  0.38667758  1.48091060  0.32227920
## [217]  0.48022506 -0.62463995 -1.40451766  0.43080135 -1.18702952  1.43227725
## [223] -0.20781876  0.30367689  0.39029589  0.02883519 -0.05130332  0.91676190
## [229] -0.75943273  0.94360307 -0.03216021  0.71708466 -1.22785993 -0.71187824
## [235] -0.01174946  1.31476666  0.44043086 -0.84642008  1.08206576 -1.98465040
## [241] -0.47544844 -0.24616245 -0.54938841  2.02815753  1.64314542  1.01712523
## [247] -0.76288068  0.38447242  1.83331926 -0.76477144  0.39878380 -0.21048368
## [253]  0.66816059 -1.23395873 -1.77855619 -1.90285464  0.22699175  1.43055068
## [259]  0.02482688 -1.71638834  0.63804545  1.35426129 -0.59141821  1.71543336
## [265] -0.79962939  1.14651646 -0.78914551  0.38819487  0.06565387  0.64789679
## [271] -0.06422354  0.06365387 -1.86759063 -1.09903142 -1.22033921  0.63401134
## [277] -1.37476410  0.18048496  0.25659096  0.60323777 -1.61328041  0.64573202
## [283]  0.39208563  0.36469779  0.21572523 -3.18979845 -1.37913425  1.20150043
## [289]  0.72254485 -0.06541433 -0.62729966  0.10859344 -1.04387440 -0.76579423
## [295] -0.21101434 -2.33717619  1.05794603 -1.19341455  0.71361775  0.34446660
## [301]  0.55167436  0.58524843  0.04856897  0.53441982 -0.69777670  0.26568332
## [307] -0.98173799  0.56001797 -0.84715494  1.49318716  0.27730539 -0.31899309
## [313]  0.39486899  0.28463481  0.41591668 -0.69388812  0.39771914  0.74918967
## [319] -1.18777635  0.86788802  0.89472233 -0.39855903  0.07856446 -0.01485076
## [325] -1.96717409  0.35128146 -0.30946626  0.67561521 -1.24062597  1.24384322
## [331] -0.58757593  1.82244050 -0.82421400  0.57699154 -0.75790291  1.61103561
## [337] -0.10341755  1.17650716 -3.07991600 -0.06387312  1.13114594 -1.38879667
## [343] -0.22434521  0.37353892 -1.30001023  0.20514774  0.98535871  0.67306820
## [349] -0.30988888  0.13994244 -1.33332738  0.17512293  0.28750593 -0.81853975
## [355]  0.46692604  0.59019171 -1.32411946 -1.74903357 -0.38728612  0.40150386
## [361]  1.19654356 -1.76708453 -1.34111569  1.11418879 -1.62511060  0.60981044
## [367]  0.32266621 -1.27909633  0.00290077 -0.22505797  0.93105066 -0.31133412
## [373]  0.01962651 -0.97216281  0.60465312 -1.79859835  1.06021089 -1.91154955
## [379] -1.19605391  0.95948692 -0.40322393  0.67411299  2.18239762  0.32971608
## [385] -0.75920879 -0.93810862 -0.10843725  2.40768352 -2.36714614 -0.86105762
## [391] -0.16185847 -0.56790147  0.24365882 -1.07805899 -0.97038481  0.98009461
## [397]  0.94261849  0.12894932 -0.07703927 -0.99528826  1.08136531 -0.40164190
## [403] -0.47954540 -0.52802660 -1.51078454  0.04788843  1.11119850  0.36263892
## [409] -0.17516785 -0.18779556  2.17354317  0.95227846 -0.61491834 -0.24809499
## [415] -0.05019817  0.67797219 -0.48361879 -0.70477443 -1.25328371 -0.05688377
## [421] -0.38079836  1.21786669 -1.55132654 -0.93747098  1.39780661 -2.44493228
## [427]  0.17303668 -0.05243927  0.18583513 -0.29892577 -1.73803681 -0.13384979
## [433] -0.02704054 -0.53067617  0.02789526  1.26178038  0.23337248  0.68919596
## [439] -0.35797899  1.24638771  1.21648457  0.21409113  0.24056692  0.38160057
## [445] -0.36518735 -1.09509512 -0.98450318  0.92891890 -0.62762561 -0.05241293
## [451] -0.35174243  0.14707109  1.28110918  0.72466688 -1.56121121  0.11002113
```

```
## [457] -0.37782438 -1.56297985  1.95809703  0.14271726  0.49868575  0.11681044
## [463]  1.01761606 -0.03730231 -1.16257300  0.23640492 -0.61047026 -0.72442235
## [469]  0.56965513 -0.20078953 -0.61651460  0.66391982  0.82619454 -1.53250170
## [475]  1.45681335 -0.86639507  0.09649753  1.21828580  0.81207886  0.46528380
## [481] -1.26952518  0.26711963  0.12164896 -1.12140491  1.52524377  0.41495121
## [487]  0.38745560  1.04362089  0.60878867 -1.14293138  1.19720652  0.94186543
## [493]  0.39119539 -0.36423232 -0.95966983  0.05185798 -0.13300240 -0.35172235
## [499]  0.51362837  0.68810635  0.44039523  0.09772241 -0.55753723 -0.60875668
## [505] -0.64997729  0.58137865 -2.16353882  0.51810448  1.01432134  0.38655318
## [511] -0.32623682 -0.79944744  1.29179664  2.49205759  1.17181231  0.45070152
## [517] -0.11355239 -0.55901911 -0.40125143 -1.41892680  1.27697140 -4.12773414
## [523] -1.01300368  0.85190901  0.49591624  0.43153262 -0.35361715  0.86361748
## [529] -1.09249670 -0.04086685 -0.24846384 -1.02825803  0.45546936  1.40879912
## [535] -0.93114382 -0.65065134 -1.41247013 -0.45721781  0.73331563  0.67839030
## [541] -0.06763365 -0.22996575  1.27614823  1.32961099 -2.09366296 -1.14351062
## [547]  0.40427011 -1.64795968 -0.50882415  0.05857693 -0.29303664 -0.09150093
```

```
rnorm(df$Recovered)
```

```
##   [1]  0.1470817102  0.4016603839  0.4491372990 -0.1089512691  0.0054589169
##   [6] -0.0167932413  0.0963241865 -0.5262347633  1.1014184295  0.2670342243
##  [11] -0.5272428871 -0.8832414913 -0.9655602555  1.3027109932 -0.7614263983
##  [16]  0.3251139787 -1.2722347417 -1.2536175327  0.1827567349  0.2405682191
##  [21]  0.2523477637  0.0189914627  1.6030287121 -0.4712669708  0.3935903515
##  [26]  0.3312944337  1.0141289354  0.4706185696 -0.4813224086  0.0249847016
##  [31] -0.5579923392  0.1296965683 -0.0548181083  0.0679926895  0.1437373130
##  [36]  1.5588804024  0.4444382768  0.4188274180 -1.0578788893 -1.3906276857
##  [41]  1.2715709028  0.3774974854  0.6945583424 -0.9854831853 -0.2687824425
##  [46] -1.6798952797  1.1010452372 -0.0882395948 -0.2164486836 -0.2882132651
##  [51]  1.7154452338 -2.3210319291 -1.4690714686 -0.0132222639 -0.2173998368
##  [56]  0.9681193567  0.8164433130  1.4288599345  0.2078222080  0.5953128519
##  [61]  1.8191699884 -0.8112359835  0.1611507278  0.7608442296  0.8616506214
##  [66] -0.1546821216  0.0317799933 -1.1977951670 -1.5822233683  0.7956794097
##  [71] -0.1752802355  0.2169493058 -0.8441874318  0.2437267261  0.1703735796
##  [76]  0.6878917528  0.2996413499  0.6765583371  1.4732441169  1.1523593568
##  [81] -0.0215930896 -1.7874123361  1.1299517928 -0.0483977238 -1.0446072049
##  [86] -1.2563457942  0.0383777733  0.0802590559 -0.8084731907  1.0283112642
##  [91] -0.8444182319 -1.0261815147  0.5424518492 -0.1736071873 -0.8166948558
##  [96] -0.5152889935 -1.2439621459  0.3055410117 -0.4105250445  0.3840179398
## [101]  0.1460355776  0.3541162790 -0.8870135847 -0.0764719501 -0.8519929178
## [106]  0.6198341717 -1.3738179122 -0.0449651039  0.3994173313 -0.0126554914
## [111] -0.8843831340  0.1573593971  0.3593237836  2.2743844473 -0.7308210066
## [116] -0.5832876078 -1.0485879570 -0.6850919748 -1.5200750902 -1.9453082039
## [121] -0.0983100981 -0.6610028233  0.2835369620  0.5336360526  0.9570213652
## [126]  0.0517704699 -0.3024784152 -0.7982655516  0.5058730468  0.3381641721
## [131] -1.1691720768 -0.1395540663  1.6502203961 -0.1070719963  0.6820179584
## [136]  2.1098697661  1.6126740670  0.4278161809 -1.0107391057 -1.6627119103
## [141]  2.0566496441  0.4928141404 -0.1502201366  1.0447386315 -0.0821967863
## [146] -0.6786810587 -0.3668484522  0.0379777502 -0.0792297430 -1.4553319804
## [151]  0.6398927633  1.3083595121 -1.5718870979  0.4456134450  0.4552064751
## [156] -3.5827846829 -1.6413305924  2.2197538933  1.0382763381  0.3025337080
## [161]  0.4219581005 -0.7318610401  1.8653715308 -2.2343720558 -0.5785399056
## [166]  0.2696713182 -0.3461748998 -1.5650812076  0.5236675368 -0.1526898621
## [171]  3.0453813856 -1.2152482302 -0.2442784114  1.8497081647 -0.1820991062
## [176]  0.2251113209  2.0410294175 -2.6504623361  0.0760385388  0.8251787295
```

```
## [181]   0.3409239601  -0.0402042905   0.9119290888  -1.1014061465  -0.5805837322
## [186]  -0.6406198891  -1.1364874620  -1.2249181190   0.7149924253  -0.2110910592
## [191]   0.1057480692   0.1808032584  -1.5844238339   1.0971675998   0.3322085690
## [196]   0.6889166006  -0.5254638364   1.2364179208   0.0930175424  -1.2556015238
## [201]  -0.0363731343  -0.7897534446   0.1618440033  -0.7212021459   0.0577509722
## [206]  -1.0499942746  -2.9952873468   0.0573348983   0.5030376754  -0.5389059087
## [211]  -0.8989713068  -0.4280716524   1.3400245804   1.4435740545  -0.1174152239
## [216]  -0.5026040021   1.9847658828   0.0741809389  -1.2025731383  -1.6915570491
## [221]   0.4373735176  -0.7252107931  -0.9983578586   0.5618286157   0.4383456000
## [226]   0.3880777260   0.3367099301   0.3350468706   0.0824792818  -0.9949508190
## [231]  -0.1367365866  -0.3536413260   0.2101467159   1.2087393952   1.2446677813
## [236]  -0.8718935333   0.4228211758  -0.2818919873   1.4594215544   1.9494368385
## [241]   0.4218509145  -0.3198450351   2.0546621163  -0.8321669230  -1.5890099285
## [246]   1.5441397983   0.8929513274  -0.0801573634  -0.0811648735   0.9730831266
## [251]   0.3844421416   1.2092833930  -0.3454625394  -0.1969916965  -1.1025559794
## [256]  -1.1977551362  -0.1589871283  -0.0319648332   1.1559974499   0.5290012615
## [261]  -2.2261482252   0.6091318460   0.8253668250  -0.8740656187   1.3375784261
## [266]   0.3543195639  -1.9778554027  -0.0175657383   1.5201230060  -0.0274514443
## [271]   1.4155426784  -0.0164348758  -1.4433667630   0.8492798307  -0.3024822552
## [276]  -2.2242696072   0.0621554352  -0.6997745533   0.4654953551   1.1780288620
## [281]   0.7592400710   0.5942727177   1.2239074501   0.0585920602   0.8616977509
## [286]   1.2274321307   1.4717534045   0.2278238956  -0.7622532469  -2.0824370909
## [291]  -0.2098760048  -0.9544763985   0.6487473643   0.5392206776   1.9584309706
## [296]  -0.1544478329   0.3320824738  -0.3164392130  -0.7127838736  -0.3782348513
## [301]  -2.2853776448  -0.1948247091   0.2167098003  -1.2214743107   0.5616274038
## [306]  -0.1192597581   2.1266059708  -0.2073569965   0.0525819495  -0.3085677543
## [311]   0.8621156923   0.4123159056   0.6529199075  -0.1649598734  -1.0865373556
## [316]   1.1281278121   0.6749751321   0.5337962093   0.9716075478  -0.9813838646
## [321]   0.2691882632  -1.8146332776   0.0217874617   1.1716570507   0.9260871342
## [326]   0.0496684932  -0.6764072703   0.7683466041  -1.8144543302  -0.2648823051
## [331]   0.1460011781  -1.3777862207  -0.4578685249   0.0646235349   0.5086545868
## [336]  -0.8614959575   0.3513739885   2.2780907315  -0.7068886943   1.1967713376
## [341]   0.6163658498  -0.8894048530   0.6449785010   1.2788535941  -0.6212393807
## [346]   0.6312904672   2.3507731519   0.7113819265  -0.8607991059   1.9954952971
## [351]  -1.6219092678   0.1747165397  -1.6129712165  -1.0086286313  -1.3499521863
## [356]   1.3414444844   1.1449434155   0.0487436855  -0.4552312632   0.6027043571
## [361]  -1.0319177316  -1.6321088903  -0.4483939611   1.0492382513  -0.7261592612
## [366]   0.6254107065  -1.3263362908   0.8958711235  -1.0502254667  -0.5230552787
## [371]   0.9593970330   0.7507906437  -0.7361909794  -0.6050404247   0.0119758039
## [376]  -0.2766734840  -1.6282446650  -1.3322322735  -1.7795778302   0.5913459812
## [381]  -3.1819321650  -1.1986096884   0.8443066716   0.0199718476   0.8930540711
## [386]  -1.6410793219   0.3256130650   0.4712205115  -0.3302056181   1.9007537670
## [391]   1.0703194974   0.3911681963  -1.1264827103   0.5827672760   1.2228828480
## [396]  -1.4503455864   0.8530281676   0.3126515367  -0.9432467425  -0.2670629286
## [401]   1.3311133733  -0.4496893741   1.5871668753  -0.7114398410   0.1501600675
## [406]   0.3665193231  -0.5162028778   0.1965695306   0.0357207003  -1.9472125433
## [411]  -1.1689913784  -0.4546125890  -1.5139593222  -0.6420314645   1.9011719003
## [416]  -0.3875671681  -0.7186271152   0.8275687340   0.5266947649  -1.0212459500
## [421]  -1.5014016752   0.8205376939   0.9081852602   0.5801658748  -2.7981478223
## [426]   0.5810991581  -1.4842569188  -0.8585699287  -0.4728452926  -0.5513304575
## [431]   0.6920250280  -1.2471906383  -0.5784211520  -0.4063173518   1.2589596722
## [436]  -1.0241508946  -0.0604544967   0.9445963192  -0.4357462791  -0.3125593530
## [441]   0.1952347434  -1.8056499844  -1.1075270360  -1.0233843064  -0.0816794202
## [446]  -0.9252787965   0.7701685267  -0.4863650047  -0.5681485918   0.9077710259
```

```
## [451]   1.7778263982  -0.9298864539   3.3891651270   1.0579245509  -0.4180839375
## [456]   0.5765280764   0.3996941378  -0.0159477285  -1.5702400766  -2.2346788839
## [461]  -0.4733186859  -0.2381719914   1.3285763180   0.2998289224   0.9374218569
## [466]   0.8653540268  -0.3368195245  -0.2226358794   1.4285322460  -1.2277526967
## [471]   0.9032198804  -0.0003466574  -1.1178104621  -1.0535014347  -1.0033038833
## [476]   0.0636565160  -0.0996348640  -0.3989404168   0.6958369236   0.5904010660
## [481]   0.3733345337   0.6826842347  -0.3121890874   1.2043753731  -0.0314197069
## [486]  -0.0799633218  -1.7593586958   0.7864008287   0.3061436582  -0.5909973148
## [491]  -0.1994896949   0.1740492372   0.0723823381   1.0469681389  -0.3639372768
## [496]   0.9343002889   1.5438222367   0.0648289376  -0.5879102021  -1.7138940685
## [501]   2.3843318044  -0.0811787337  -0.2310068063   1.7636635796  -0.0831067836
## [506]   0.4143797311   1.3771179388   3.4384635957   2.5644914051  -0.9556103148
## [511]   1.3351500395   0.0571520955  -1.5890755197  -0.2407157024  -1.6624786770
## [516]  -0.5662628465  -1.9963934418  -1.7592825496  -0.3588880240  -0.4169258316
## [521]  -0.0597797781   1.1674627661   0.1023781970   0.3953255301   0.5023915095
## [526]  -1.6273347926   2.1831055478  -0.4279082772  -0.4140683571   0.3790129159
## [531]  -0.3390438997  -1.1406648175  -0.3034345523  -0.8813964882   0.8517849467
## [536]  -0.4835023167  -0.7984515096  -0.5585242488   2.8877277763  -1.4023427246
## [541]   0.6371019387  -0.5600776816  -0.6441915457   0.6212063399   0.4403742336
## [546]  -0.6314113969   1.0492531603  -1.5112145826   0.8816242501   1.5277677301
## [551]   0.6245316552   1.8984924625
```

rnorm(df$Deceased)

```
##   [1]  -0.199542206  -0.573613176  -1.330892450   0.765108880   0.502127188
##   [6]   0.067040930  -1.306564833   0.966270294   0.040851925  -0.034975090
##  [11]   0.213645566   0.525980910   0.200039219   1.245951209  -0.816430167
##  [16]  -0.938121844   0.033234241   0.101859675   1.152951136  -0.506192759
##  [21]  -1.503380940   0.696587928   0.610265734   0.205379737  -1.203077750
##  [26]  -0.805070033   0.165717163   0.082645315   1.027217090  -0.687406555
##  [31]  -1.018589342   0.057109439   1.306860390  -0.707329043  -0.529694198
##  [36]  -0.526097474   2.398773356   0.370425012  -0.320458805  -0.023245929
##  [41]   0.209936320  -2.492417047  -0.055831941  -1.461185418  -0.933731860
##  [46]   2.018002492   0.410170904   0.431976935   0.438794327  -0.618060734
##  [51]   0.373479863  -1.010974283   1.435177484  -0.146774308   1.039114342
##  [56]  -0.646780892  -0.634273122  -0.455396267  -0.718731279  -0.250112869
##  [61]   0.672407236  -0.596899764  -1.017981500   0.780039845  -0.236501164
##  [66]  -0.141690961   0.929106898  -1.027992256  -2.093159131  -1.231624049
##  [71]  -1.732051530   0.875900444  -0.207244544  -0.735667714   0.123270433
##  [76]   0.719192711  -0.216050403  -1.178974682  -0.205364973   0.085086486
##  [81]  -0.237352477   0.125731003  -1.259672272  -0.686202152  -0.888999883
##  [86]   0.566328236  -0.593187442  -0.352799857   0.515780667   0.042617845
##  [91]  -0.371305998  -0.654624401   1.003629092   1.297016139  -0.016546243
##  [96]  -0.041526954   1.117075515   1.400820433  -1.041245838   0.347385620
## [101]   0.182911413  -0.525461409  -1.091223637   0.542559185  -0.409004042
## [106]  -0.413954777  -0.388027495   1.114392419   0.227268145  -0.818185748
## [111]   0.797755308  -1.511601395   0.887698859  -0.215507610  -1.830074335
## [116]   0.362054721  -1.996318754  -0.172233887   0.774634781   0.168241125
## [121]  -1.284093432  -0.810088369   2.157071399   0.317071396   2.185231904
## [126]   1.001891960  -0.017440758   0.017929262   1.146417653   0.696278637
## [131]   0.999109922   0.333907564  -1.122591008   0.037673235  -0.737446842
## [136]   0.672681403  -1.411844150   1.818101614   0.503429447   0.713800612
## [141]   1.682876847  -0.216797256   2.292495181   2.091986644  -0.755279933
## [146]  -1.674879775   0.525430471  -0.609829225   0.064141534  -1.400857046
## [151]   0.004059779  -0.331972969   1.091566147  -0.686296917  -0.406671258
```

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## [156] -0.067137785  0.185168096  1.310143970  1.437294416 -0.263216122
## [161]  0.406592584  0.113775800  0.578156398 -0.531093249  0.962758262
## [166]  0.570754408 -0.918655617 -0.794704800 -0.488886202 -0.665946703
## [171]  0.258861659 -0.763828814  1.295379883 -1.214844592  0.160838150
## [176] -0.759138399  1.270317590  0.213776630  1.056478064 -1.024957584
## [181] -0.096374237 -1.414260531 -0.325975938 -0.162644663  0.939207744
## [186]  0.141259162  0.458819606 -1.445956056  1.082650137  0.001761517
## [191] -1.399713819 -0.932053147  0.073037528 -0.363158158 -1.844776691
## [196]  0.234088144  0.981959371  0.951943261 -0.570504981 -0.352579729
## [201]  0.567600872 -1.489565306 -0.511063100 -2.817221874  0.208016553
## [206]  0.379396921 -0.100640711  0.510238545 -0.492336819  0.564917114
## [211] -0.087127181  0.180103532 -0.786223018 -0.198390706  1.245287781
## [216] -0.905636494 -0.672249126  1.748799674 -1.722982446 -0.581299666
## [221]  0.292925432  2.220977668  0.777341449 -1.130490705 -0.604933232
## [226]  0.591418613  0.621407165 -0.894115738  0.215507548 -1.997283538
## [231] -0.809725181 -1.064021590 -1.262331649  0.460283553  0.894509686
## [236]  0.618256277 -1.318388269  0.504306128 -2.182452487  1.311461569
## [241] -1.438676508 -0.468777971  1.625693437  1.545336015 -0.537652725
## [246] -0.395438577  0.400416275  0.448764254 -0.208581634  0.458802573
## [251]  0.403833226 -0.021067252  0.551042522  0.263750906  0.770447210
## [256]  0.601392238 -0.976311227  0.127048537 -1.308556019 -1.538432691
## [261] -0.616378865 -0.796024856 -1.227018911 -0.876638174 -0.181924698
## [266] -0.032878463 -1.047785584 -0.462671592  0.141999690 -0.732263972
## [271]  1.057823466 -0.337494568  0.536744782 -2.249212633 -0.577826237
## [276] -0.882171908 -1.152571907  2.940624511 -1.435840553  0.330280269
## [281]  1.519830860  0.508706460  0.785787738  0.308288030  2.503687127
## [286] -0.668474841  1.846015097 -1.820043522  0.580590273 -1.298153031
## [291] -0.963205569  0.910260697 -1.238790355 -1.682777983  1.789017601
## [296] -0.457920433  0.029876016 -0.491620868 -0.083654961  0.156831142
## [301] -0.159024948 -0.405947470  1.029482246 -0.389097412  0.166205399
## [306]  1.284707507  0.106112498 -1.238662842  0.134512707  0.284347643
## [311]  0.739564721 -0.818627596 -0.111463597  0.267993380  0.665751161
## [316]  0.157676516 -1.240948400 -0.524297229  0.328338035  0.067416534
## [321]  1.043932011  0.964508207 -0.305728018 -1.903127200  0.242836514
## [326]  0.068693406 -0.231401691 -1.806036354  0.610496978  0.572067372
## [331] -1.640011655  0.610446629  0.709824022 -0.116330748 -0.435879824
## [336]  0.676921593 -1.813792629  0.447733953 -1.251696915  0.647602227
## [341] -0.898885613 -0.400410498 -0.776609661  0.619566460  0.645568197
## [346] -0.671087522 -0.662547017  0.011438892  1.109999837  1.559500309
## [351]  0.676871214  1.353924520  0.426490395  1.021040434  1.956981226
## [356] -0.349541994  0.688115664  0.797566129  0.852182464 -1.723396868
## [361] -0.345463453  0.658107610 -0.260257759 -0.473460569 -0.417080944
## [366]  1.824415772  0.633800477 -0.012997845  0.024871657 -0.749940841
## [371]  0.515388524  1.344142929  0.546848615  0.113969738  1.332746750
## [376] -0.631214910 -0.722575476 -0.624915942  0.451139329 -0.392339301
## [381] -0.877978132  0.933328512 -1.034081097 -2.098643708 -0.759950973
## [386]  0.655321450 -0.130816650  0.944530728 -0.371352153 -1.086031122
## [391] -0.386293447 -0.476120731  0.830269239  0.397535397 -0.447071247
## [396] -0.027452153 -0.164654858  0.542559132  2.083936420  1.121864893
## [401]  1.076299832 -0.711614680 -0.291454997  1.567642103 -1.974500751
## [406] -1.223072784 -0.355298171 -1.221938875 -1.549441299 -1.803658811
## [411]  0.241394727  1.063161287 -2.416996972  0.310609215 -1.008493258
## [416] -1.098242547 -1.848147056  0.788341819  0.685980635 -0.832047413
## [421] -0.727433631 -1.806588594  0.016663743 -0.540488189 -0.326786883
```

```
## [426]   0.213838081 -1.025018824   0.763907514   0.054829961   0.447550806
## [431]   0.052030983   1.903616041   0.313947669   0.234290742   0.026173849
## [436]  -0.840539576 -0.105615973  -0.400679350   3.277784871   1.701245858
## [441]   2.312199321   0.022999596  -1.656345645  -0.191899058   2.107887441
## [446]  -0.210126853 -1.079454458  -0.150521171  -0.194249289   0.157429577
## [451]  -0.944106926 -0.439180995   1.425365340   1.159951455  -1.179263563
## [456]   1.753261114   0.934768392   0.112979145   0.242862520   1.787535794
## [461]  -0.563301384   0.066244305  -0.711796770   1.106142020  -0.808514454
## [466]   0.866611780 -0.293264928  -1.345353805   0.388532646   0.057504293
## [471]   2.061276865 -0.380962498   1.026894074   0.051735638   0.298206331
## [476]   0.288673293   1.116845080   0.077846820  -0.572092217  -0.107860851
## [481]   0.946393166   1.209996257  -1.779267348  -1.142898040  -0.589126647
## [486]   0.652940430   0.891175478  -0.226272095   2.344762171  -0.214995320
## [491]  -1.672187049 -0.079942180  -0.102302983  -1.017110516  -1.954788660
## [496]   1.427444906   0.892940261   2.040149242   0.086844756  -1.103866843
## [501]  -1.602221053 -0.162572036  -0.300931234   0.825990145  -0.175077265
## [506]   1.344032846   0.175683085   0.559053971   3.294014296   0.316889999
## [511]   2.107016955   0.505300263  -0.632118179   1.323708666  -1.306569199
## [516]   0.928660678   0.815228864   0.505345199  -0.642664856  -0.669665982
## [521]   0.707388172 -0.094083165  -1.551252015   1.627163429   0.435296126
## [526]   0.721176076 -0.246026013  -0.647604590   1.068931436  -0.163021312
## [531]   0.708850039 -2.795418617  -0.150386870   0.236968701  -1.450898020
## [536]  -0.723329016   1.314026961   0.417586143  -0.082062597   1.654822296
## [541]  -1.496570332 -0.538414581   2.121563604  -0.486156074   0.012457087
## [546]   1.430897842   1.580020140   0.497370173   2.408169826   0.281138281
## [551]  -0.333964051   0.287696184
```

```r
rnorm(df$Confirmed,mean=0,sd=1)
```

```
##    [1]  -0.935927093   1.310773966  -0.259194797   0.597743150   1.218853485
##    [6]  -0.582059538 -1.508450024  -1.442007541  -1.501335553  -0.630065319
##   [11]   0.152500588 -0.084665292  -1.121895501  -1.476372569   0.810151777
##   [16]   0.689233852 -1.443073424  -0.431863875  -2.004186369   0.409301314
##   [21]   0.564133417   0.980739279  -0.628044140  -1.317123856   0.230302780
##   [26]   0.842535014   0.769877819   1.596733934   1.555156743  -0.122252458
##   [31]  -0.336410391 -0.917571329   2.497790937   0.611600223   0.945617481
##   [36]  -0.895359574   0.656469096  -1.213778729   0.750684330  -0.587314663
##   [41]   0.211529725 -0.862336042   0.929891742  -0.630879053  -0.531840969
##   [46]  -0.099531385   0.904218570   0.257357066   0.439984553  -0.177168055
##   [51]   1.108644967 -0.073773597   0.441843929   0.156642634   0.824260083
##   [56]  -0.324857867 -0.498084737  -0.478414474  -0.266800909   0.367988367
##   [61]   1.146377206   0.996356977  -0.412306104   0.845463946   1.036577676
##   [66]   1.636135636 -0.015291517  -0.164907969  -0.988847474  -0.815026441
##   [71]   0.673640897 -0.736305933   0.777529923   0.263648039   1.843401743
##   [76]  -0.998265328 -0.733628407   0.177176659   0.817639896  -0.674757409
##   [81]  -0.252747772 -1.371220495  -1.000027275   1.183298408   2.037879280
##   [86]  -0.709048846   2.138421140   0.672756107   0.577821723   1.573476774
##   [91]  -0.736750662   0.888237438   2.920598492  -1.007040911  -0.714022582
##   [96]   1.146737280   0.201994685  -0.145389343   0.252322704   0.628480079
##  [101]   2.398753040 -1.686209857   1.718443311  -1.306448720   0.407642408
##  [106]   1.768554808 -0.443525618  -1.722671752  -0.884731040  -0.646735335
##  [111]   0.176808048 -0.051384947  -0.361117017  -1.526802206  -0.819293044
##  [116]  -0.031639373   0.924705490   0.837662670   1.579749942  -1.718182182
##  [121]  -0.271191199 -0.629374370  -0.587939485   0.565410788  -0.071022752
##  [126]  -1.622838899   0.117432325  -0.283109778  -0.887637326   0.368596560
```

```
## [131]  1.875912472 -1.045144042  0.417153937 -1.881490173 -1.656531279
## [136]  1.039704785 -0.358225416 -0.620258887 -0.130108168 -1.039017156
## [141]  0.334573400  0.595637554  0.812096442 -0.029975330  0.177345222
## [146]  0.552258249 -0.179411233 -0.277687896  1.240529421 -1.843782839
## [151]  0.887909150 -1.012117221  0.181859371 -1.851875001 -0.327266893
## [156]  0.398470601 -1.485707028 -0.959391980 -0.843891118  0.231860178
## [161] -0.346038008 -0.657483144  0.106512872  0.999862067 -0.048947000
## [166]  0.510675322  0.916783628  1.060658508  1.775837659 -1.368240147
## [171] -2.036446220 -0.424448845  0.715155136 -1.655084442  0.148949893
## [176]  2.161656677 -0.231290238 -0.195590562  0.265336394 -0.433994784
## [181] -1.519467410  0.592705872  0.488958474  0.487002749  0.226795747
## [186] -0.425407571 -0.136975453  0.353119302 -0.413504889  1.361775288
## [191] -0.090132659 -0.671861981  0.253492390 -0.777838194  1.182108328
## [196] -1.139120846  1.424121241 -0.211739146  1.385627614  0.411102751
## [201] -0.714248346  0.581033282 -0.049388901  1.192413709 -0.271504589
## [206] -1.963979592 -1.285649141 -0.418676370 -0.785724900  0.007969563
## [211] -1.256785152 -0.193677102  0.036699217 -0.293117033 -0.392067564
## [216] -1.202495215  0.342797087  0.261987747 -0.899456336  0.580411421
## [221]  0.121446919  0.554978098  0.448846543  0.478731698  1.088596590
## [226]  0.683527151  2.620907196 -0.941195322 -1.359897786 -0.575057848
## [231]  0.675393333 -0.062707072  1.196291604  1.064077479  0.471427531
## [236] -1.033921472 -0.951621774 -0.122502759 -1.197076595  1.349592689
## [241] -0.032317243 -1.997620952 -0.563771954 -0.227538822  0.268946025
## [246] -0.705651955 -0.423262148  0.117717843  1.837586956  0.652191917
## [251]  2.265344262 -0.614032721  0.143642287 -1.919168927 -0.506235035
## [256]  2.570084570  0.600592359  0.061808164 -1.650376301  1.675399030
## [261] -1.071858647 -2.702682352 -0.717248091 -1.923779327 -0.003225510
## [266]  0.357991852 -0.498521911 -0.311489240 -0.578598467  0.504676508
## [271]  1.196531754  0.721938425  0.070831122 -0.165310880  0.206073101
## [276]  0.135119236  0.134492270 -1.748172031  2.379761354 -0.734419376
## [281] -0.470601614  1.087483980 -0.855555666 -2.165886608  0.085707225
## [286]  0.060135291 -0.426347026 -0.834635295 -1.173813260  1.292241696
## [291] -1.165331658  0.681372267 -0.385422033 -0.049348002  0.441435268
## [296] -0.486482044 -0.965956610 -0.470540781  0.248875546 -0.146009607
## [301]  0.176527278  0.148707593  0.257617080  0.472716049 -1.432923699
## [306] -1.163295877  0.605652620 -0.580909632  0.988882677  0.596587265
## [311] -0.177759853 -0.756634816 -1.459096724  1.466756152 -1.737359426
## [316]  0.586189508  0.411837912  1.307002054  1.050770838 -0.424429247
## [321]  0.980403967  0.549941180  0.167803972  0.113525630 -1.063338617
## [326] -1.584047665 -0.262579329 -1.290217441 -0.866927173 -0.244726134
## [331] -0.283795322 -0.812185842 -0.539892530 -0.508525182  0.912339704
## [336]  1.312040128  1.302389856 -0.771728516  1.492519493 -0.195508867
## [341]  1.976118815 -0.204307093  0.104814679  0.689442538 -1.372570562
## [346]  0.958674075  1.060519906  0.739552827 -1.434421700 -0.143977632
## [351] -0.759873000 -0.480277110 -1.750434011 -0.920678925  0.482135059
## [356] -0.360913492 -0.070397080  1.515188010 -0.642557575  1.341113045
## [361]  0.332178034  0.088453817 -0.672025187  0.438945045  2.058275554
## [366] -0.423395023 -1.278177606 -0.859480132 -0.574666187 -1.103487431
## [371] -1.592822393  0.125568222  1.614895485  0.302538807 -0.648206629
## [376]  0.814816353 -0.209191682 -0.811024396  1.288324027 -0.321091742
## [381]  0.435399475  0.665909398 -0.317595506 -1.197228072  1.618103925
## [386]  0.083522770 -1.435343538  0.294124606  0.159848599 -1.289248269
## [391]  2.061729869 -0.536061004  1.310922208  0.370066616 -0.769033235
## [396]  0.881576490 -0.411151842 -0.008685279 -0.178772657  1.980985278
```

```
## [401]   1.172333023 -0.214290157   0.547502832   0.448871831   0.990491667
## [406]   0.245268725 -0.620947142   0.248983348 -0.675121662   0.645438931
## [411]   0.255311125 -1.187276594 -0.049890478 -1.115705356 -0.447139745
## [416]   0.258636370 -1.404465878 -0.038062080 -0.692668078 -0.371958258
## [421]   0.899120716   1.034550225 -0.698316646   0.249977806   0.327059823
## [426]   2.050005652   2.012285510   0.111785507 -0.545670767 -2.138187942
## [431]   2.082165176 -1.898904629   0.998817578 -1.137456553 -0.855651445
## [436]   0.297897224   0.752187528   0.571216111   0.045942453   1.168654393
## [441] -0.081488247   0.523169018 -1.651480039   0.299174704 -0.935415416
## [446] -0.411241401   0.937502016 -0.264204833 -1.228034653 -0.102072322
## [451] -1.194741763 -1.180267202   2.503105108   1.681567588   1.304262463
## [456] -1.405189527   0.308456019 -0.755670223 -0.600691654   0.219343292
## [461]   0.219470992   0.065649720   2.029193288 -0.362407961   0.016985450
## [466] -1.423522576   0.592350342   1.097417914   0.924396040   0.403750328
## [471]   0.612536085 -0.532740778 -1.321938275 -0.530167517 -0.287990728
## [476] -2.617095436 -0.290865700   0.044263592   0.962319141   0.171415285
## [481]   0.980834143   0.411969486 -2.293409129   1.430905409   0.450155991
## [486]   0.279628117   0.562097502 -1.141014259 -0.609218988 -0.913764938
## [491] -0.879837359   0.954660548 -1.189195342   0.904106231   0.872764920
## [496] -0.242309940   0.009054066 -1.015162697   0.137170251 -0.063235226
## [501]   0.876662714   0.040575936 -1.072546538 -1.055010278   0.181677273
## [506] -0.108486403 -1.467228482 -0.312382298 -0.202645554 -1.406322062
## [511]   1.665420893 -0.350909593   0.296565774 -0.556867238   0.779720943
## [516] -1.976226272 -0.199176766   0.767482893   0.199567817   2.026106308
## [521]   0.062897980   1.356736103 -1.453400513   0.587490610 -0.287977826
## [526]   0.016632934 -0.338671130 -0.937434253   0.354752439   1.089404467
## [531] -0.436768400 -0.897426707   0.873814465   0.543956203   0.128109270
## [536]   0.424763444   1.589833258   1.084335082 -0.185588451 -1.186630409
## [541] -0.224626329 -0.436638801 -0.651256525 -1.224046661   2.364483843
## [546]   0.006386093   1.475651286   0.482623661   1.376852596 -1.889988776
## [551]   0.670525559   0.514795577
```

```
rnorm(df$Recovered,mean=0,sd=1)
```

```
##    [1] -0.476427604   1.095742149 -0.655071221   0.811231782   1.266931327
##    [6]   0.012280882   1.505874886   1.925682007 -0.370344478   0.685122915
##   [11] -0.796112883 -0.464012968   1.326994653   1.415973330   1.157724238
##   [16]   0.463766300 -0.824551190 -0.394001072   0.635968940   1.272323135
##   [21] -0.882022757   1.107721670 -0.405728918   1.900364257   1.673292041
##   [26]   2.027646837 -1.894631702   0.475664478   0.369655499   0.326785098
##   [31] -0.833282368   2.091032734   0.495864459   0.438207684   0.649708792
##   [36] -0.685380000   0.427289640 -1.134303179   1.342684402   0.187874527
##   [41] -0.793743145 -0.020279932 -1.342672703   0.428712232   0.449877138
##   [46]   1.989527803   0.618825953   2.313618372   0.473446861   0.540855896
##   [51] -1.512823062 -1.304306215 -0.021055015 -0.950297241 -0.039780838
##   [56] -0.325847320   1.735510885   0.427019357   0.184533168 -0.703473825
##   [61] -0.313867121   1.217892171   0.025753916   0.051934890 -0.794094871
##   [66] -1.022667034 -0.047978925   0.259647989   0.775847241   0.293025329
##   [71] -1.868302920   0.856758373   1.268821209   0.895880847 -0.189924177
##   [76]   1.321923908 -1.794901179   0.989260439   0.220928744 -0.267359629
##   [81] -0.884210865 -0.825201423   1.387328140   0.238951891   1.890156683
##   [86]   1.790545977   1.220220124   1.294518750   0.676860671 -0.065157011
##   [91]   1.247054927 -2.024627949   0.924962321   0.208078808   0.414066707
##   [96] -1.294850834 -0.691887242   0.388205230 -2.041362151 -0.816699367
##  [101]   0.069760212   0.380236497   1.307790560   0.242230414 -0.223328690
```

```
## [106]   0.692045335 -0.590700390  0.449400990 -0.603669740  0.362615930
## [111]  -0.336040800  0.757468466 -0.080764196  1.226489367 -1.369668290
## [116]   0.200857654  0.945282844  0.513495437 -0.681328361 -0.866226822
## [121]  -0.134238733  0.497251876 -0.052770431  0.867502317  0.461497572
## [126]   0.578288350 -0.556126884  0.145353121 -0.684148713  2.168705709
## [131]  -0.048300347 -0.932999487 -1.539569321  0.351124862  2.722277032
## [136]  -0.004327153  2.646206191 -1.401708252 -0.879476642 -1.532324469
## [141]  -1.086331905 -0.716619616  1.344228846 -1.596979406 -1.258059777
## [146]  -0.141772723  0.919345238  1.059720001  0.169690799 -0.819258672
## [151]   0.033708026  0.091769417 -1.227649084  0.303229491 -1.649511280
## [156]  -0.353324472 -0.004009723 -0.014560721 -0.412146286  0.040158186
## [161]  -0.829162383  0.626474616 -0.148708988 -0.265492372 -1.650270883
## [166]  -0.867759684  0.560834084 -0.868463187  0.201717646 -2.840331949
## [171]   0.306764537  0.198270481 -0.192550907  0.061189284 -0.027900081
## [176]   0.842137342 -1.354069625  0.660539367 -1.619865005 -0.929858803
## [181]  -0.361040244 -0.644130803  0.633247228  0.913075754  1.199389353
## [186]  -0.099130619 -1.326455298  0.645119868  0.180367299 -0.689887386
## [191]   0.256859126  0.443659939 -0.047748200  0.088369754  0.355238521
## [196]  -0.545755791 -1.359021364 -1.218462121  0.977258454 -0.105191866
## [201]   0.413882121 -0.270806232  0.293357923  1.006561148  0.247580129
## [206]  -0.005337896 -0.704956161  0.543701583 -1.404525487 -0.011368161
## [211]  -1.168437461  0.201551558  0.250528313 -0.498098118 -1.309792030
## [216]   1.651055196  1.033656950  0.127883948 -1.407568807 -0.295794248
## [221]   1.805357325  0.009079188 -1.511764514  0.289199142  1.006937195
## [226]   0.496936565  1.235575355 -1.260950397  0.135852807 -0.566381584
## [231]  -0.322972876  1.261664561  0.197581169 -1.424325261 -0.507257734
## [236]   2.126080269  1.691868408  0.296467238  0.381109339  0.193971996
## [241]  -0.570439893  1.320542517 -0.240496506 -0.188441398  0.527480045
## [246]   0.525083123 -0.716867344 -0.032015206 -0.697594808  0.266950623
## [251]  -0.021846604 -0.687498071  1.831466876 -0.744527313 -0.267130539
## [256]  -0.750219541  2.297153725  1.063236797 -1.526925868  0.874027782
## [261]  -0.788062772  0.692682671 -0.287562622 -0.909764557  0.433741644
## [266]   0.061416006 -1.448213554 -0.100363766 -1.851451354  1.289765654
## [271]   1.726145723  1.581942556 -0.205198599 -2.173665465  0.184575554
## [276]  -0.228022332 -1.195198344 -0.175129924  0.702955457  0.727480825
## [281]  -0.756062481 -0.251041703 -0.630350614 -0.787389797 -0.502236411
## [286]  -0.006090703  1.196167518 -0.521167565  1.312499819 -0.469612887
## [291]   0.103460870 -1.328511896 -0.377199930 -0.965410529 -0.047257228
## [296]  -0.065650718  1.924576221  0.075656095  0.966403353  0.507667276
## [301]   0.011684082 -0.571026321  0.924896448 -1.262413283  1.847084800
## [306]  -0.211871403  2.725357017 -2.344829888 -0.189614006 -0.854805224
## [311]  -0.990448518  0.282070745  0.058397760 -1.021816810  2.148927855
## [316]   0.336283564 -0.685220426  0.094467147 -1.175772464  1.065329773
## [321]   0.114785482 -0.724357995 -0.476939122 -0.722954089 -0.232306081
## [326]  -1.433042088  0.410255404 -0.071648923 -0.433836199  1.482936131
## [331]  -0.196850058 -0.405571715  0.102673561  0.769556139 -0.873223941
## [336]  -0.447004957 -0.636510101 -0.725098634  0.514928599  0.321737790
## [341]  -0.919311134  0.784264951  0.437846231  0.368598958 -0.673862887
## [346]  -1.298900095 -0.196883998 -0.413457142 -1.468544451 -1.998656016
## [351]   1.880722512 -0.476519936  0.868917404 -1.445760516  0.276867112
## [356]  -0.289901231 -0.631031958 -0.496155863 -1.533610457  0.935793714
## [361]   0.399413580 -0.897577030  0.683324617 -0.659052503 -0.439238882
## [366]   2.122454625  0.858046391 -0.824750048 -0.588913184  0.188454753
## [371]  -0.517621379 -0.382409495  0.944671133  0.400953838  0.497016371
```

```
## [376] -1.709269382 -1.789106405  0.326416751 -2.106399561  0.608265831
## [381]  1.824130941  0.724597219  0.326664366  0.499953167 -1.187280793
## [386] -0.743471464  0.349713325 -0.369374699  1.192140087  0.253783868
## [391] -1.151838718  0.332533794  0.819854452 -1.728301201 -1.024250625
## [396]  0.450249904  0.930839563 -0.835827334 -0.456286204  0.468676914
## [401] -1.284564428  0.870441001 -0.728834802 -0.563180091 -0.392195698
## [406]  0.182155038  1.522937448  1.189350874  0.980210362  0.955680215
## [411]  0.114409630  0.073364874  0.577257541  0.314260824  1.083730727
## [416]  0.003278383 -0.238564806 -0.468913039  1.867363552  0.605528496
## [421] -1.490451141  0.618696642  0.932828556 -1.120035748 -1.384638150
## [426] -0.353955702 -0.188498815  0.235587131  0.834547673  1.093341432
## [431]  0.043654309 -1.253949724 -1.175504427 -0.340150731  0.534659895
## [436] -0.946745465  1.377564231  0.971635093 -0.455434398  1.303839301
## [441] -0.125053173  0.407188779 -1.923042666  0.693624076 -1.369599802
## [446]  0.250953193 -0.944139034  0.607514623  0.149092221  2.051939339
## [451] -1.399320707 -1.623031904  0.561850872 -0.404941021  0.482577929
## [456]  0.107171809 -0.660610939 -0.225966040  0.275186091 -1.350090856
## [461] -0.750563147 -1.071388476 -0.268619669 -1.037360995 -1.309039417
## [466]  0.631076911 -0.790793260  0.776041107  0.808522937  0.505291707
## [471] -0.995306157  0.634912929 -0.045022992  0.117899441  1.467039635
## [476] -0.215506238 -2.366367216 -0.046433165 -0.566590887  0.796859976
## [481] -1.082556599  0.939604324 -0.154640487 -1.664249589  0.361835641
## [486] -0.290774857 -0.281388053 -0.106986436  2.512398040  0.581066080
## [491] -1.033998871  0.421620167 -0.231020516  0.561376795 -0.960737462
## [496] -1.139070542  2.121922196  1.381867888 -0.885485556 -1.634658764
## [501] -1.352620819 -0.717100652  0.614410263 -1.538881027 -0.965365169
## [506]  0.534153049  1.029039102 -0.919570809 -0.981066880  0.299231281
## [511] -0.279177009  0.033138351  0.999976332 -0.492895694  1.225288397
## [516] -0.487526536  1.366953717  0.196559373  0.500548948  1.254638226
## [521]  0.622725497  0.358561001  0.594064288 -1.740788627  1.793421660
## [526] -0.179493902 -0.207805769  0.050816434 -1.098019521 -0.593256770
## [531]  0.033427195  1.819835078 -0.434686230 -1.757555761  0.704025749
## [536] -0.230684827  0.496163077  2.199282687  0.663785828 -1.791022720
## [541] -0.568796296  0.194201827  1.084960397 -0.585543308 -2.256641489
## [546]  0.879586630 -0.042639679 -1.113987192 -0.507731312  1.140927210
## [551]  0.449894227  0.616939175
```

```
rnorm(df$Deceased,mean=0,sd=1)
```

```
##  [1] -1.4493187886  1.5457192178 -0.1327513561  0.3754593131  2.4312116404
##  [6]  0.5665669492  0.4915345503  1.2817795534  1.4415258439 -1.0379908200
## [11] -0.3337915839 -0.7110146037 -0.0803312727 -0.5332524702  0.7371993963
## [16]  0.9650520605 -0.4991883861 -1.5467471486 -1.9021576692  2.5362886170
## [21]  0.3129615725 -0.7507623899 -0.4168743446  0.2023147831  0.7104545271
## [26]  0.1764843780  0.0843079357 -0.1733694709 -1.7221333844  0.4378612873
## [31]  0.0832268449  0.0769349187  0.6529871991 -0.2940977522  0.2929610235
## [36] -1.0319647517 -0.1487005453  0.4922439027 -0.7209421508 -0.7748225980
## [41]  2.3102343989 -0.8564676259  0.1941279536  0.1350739217 -0.3772466207
## [46] -0.6461051196  0.9728211280  0.1260339215 -0.2073475753  1.2372370346
## [51] -1.1384792017 -0.0092409645 -0.5942972599 -0.5481680563  0.2165203651
## [56]  0.2616135246  1.2202968759  0.8843540408  1.6774132602 -0.3109817196
## [61] -0.2191039266 -1.2542584623  0.9862654558  0.6372840746  0.5426631858
## [66] -2.5837751116  1.5520615274 -0.3125445373 -0.0686778483  0.1730170225
## [71] -0.2292433692 -0.0512050880 -0.1692359380 -1.5789134531  1.6515012830
## [76]  0.0055767189 -0.3188178251  0.5295211628 -0.7328817464 -1.1747121484
```

```
## [81]   0.9573235488   0.3159078305  -0.0260802057  -0.9128280218   0.1052336688
## [86]  -0.6904456226  -0.0005435843   0.4403885478   0.7739081207  -0.3443372076
## [91]   0.2685823352   1.5480424757   1.3227894580  -2.0432302793  -0.2347317427
## [96]  -2.2879134938   0.3854379209   0.2883570430  -0.1416883987   0.4453263612
## [101] -0.1806880230  -0.2765872695  -0.3775182345  -1.1008550854   0.0904614942
## [106] -1.5843247866  -1.6143460744  -1.5239479861   1.6775649094  -0.9643867545
## [111] -1.0191079583   0.4009009032   0.3694844316   0.2495180116  -0.1593209220
## [116]  0.5094005280  -0.8587348641   1.5725099497   0.4589035020  -2.6909156145
## [121] -1.3888067660  -0.7102445412  -0.2369911543  -0.4949199513  -0.8341680976
## [126] -1.3564473486   0.2587596226   0.8973540896   0.1472714030  -1.3890122392
## [131]  1.1609390874  -0.5685795031  -0.8001160810  -0.0563116761  -0.0492153862
## [136]  0.9071361010  -0.2911955637  -2.1441011511  -0.7985754579  -0.0863729393
## [141] -0.7631861860   0.8687533162  -0.8444851632   1.0429590644   1.2338452570
## [146]  1.6578523196   0.5427173344   2.0434927487  -0.5257966680  -0.8803841156
## [151]  0.8303769111   1.1954226120  -0.2209064239   0.5024925343  -0.8645488775
## [156]  0.1323043521   0.4492091566  -1.1271847148  -0.5240357561  -1.3585373312
## [161] -1.6388150679   1.0979218038   0.3210715958   0.6243424137   0.5660075114
## [166]  2.4928727764  -0.1287944004   0.6087289119  -0.7075696023  -0.5596112136
## [171]  0.4977308483  -0.6753032028  -0.3210837593  -0.7942793044   1.4337645936
## [176]  0.5743826578  -0.4858824027   0.3715726454  -0.8516225076  -0.8392440305
## [181]  2.1880496794  -0.3660351785   0.2316503328   0.9808280034   1.3150878041
## [186]  1.6216275028   2.2059894735  -0.4830854771   0.9473754382  -1.9723320895
## [191] -0.3593100506  -3.6456382209   0.7461381795   0.0773433555  -0.6951007955
## [196] -1.9824558360  -0.3277607229  -0.5193421823   2.3932436695  -1.7777357811
## [201] -0.2699556482  -1.1054519368  -0.0689674711  -1.0103980134  -0.5342602113
## [206]  1.2426492580  -0.9242516891  -2.9586076892  -2.8836537936   0.7418312645
## [211] -0.5972036141   0.2880573128  -0.2925849529  -0.0139689747   0.4669847639
## [216] -0.4647535065   1.6254274782  -0.6043091351  -0.4837366761   0.8073304127
## [221]  1.3857080266   0.6611116832   0.9082654306  -0.5966671145   1.8226059850
## [226]  0.5082524800  -0.3095573298   0.3502892822   1.1034686797   1.3107992132
## [231] -0.3993792576   0.0685874135  -0.4574273387   0.5753705036  -0.6756201949
## [236] -1.2042406009   0.9426760844   2.9335499112  -0.1264878070  -0.1859891690
## [241] -0.2486483719   1.8539605920  -0.1078856688   0.1013237056  -1.6871428936
## [246]  0.8512197270  -0.7172186864  -0.4149596418  -0.4701704153   1.6341678080
## [251]  0.0379272647   0.8849359639   1.2175820050   1.1442535634  -0.0325030621
## [256]  0.3118831622   1.1988917841   0.3251258626  -0.6364489897   1.2360318659
## [261]  1.0538499700  -0.1665065996  -0.3926404980  -1.0444446319  -0.4172220391
## [266] -0.5265487368  -2.1036372458   0.6951482913  -2.2340463824   1.4221151659
## [271] -0.2558389845  -0.0870928903   0.3167286469  -1.2285039964  -0.5070321168
## [276]  0.5281938946  -0.2712418725  -0.2984271943   1.3495877752  -1.0710149119
## [281]  1.6855876539  -1.6409812574   1.3215876797   0.5393255263  -0.3210322796
## [286] -0.0088858803  -1.1744422087  -1.0414220953   0.8074675288  -0.5979369284
## [291]  0.0880127650   1.3650601854  -0.9844761552   1.1083769661  -1.3335254657
## [296] -0.8418282949   1.8524018896   0.3244245547   0.5851714937  -1.1831359957
## [301]  2.2518172373   0.1807937439  -0.5921846299   0.1535737974  -0.0318778100
## [306] -2.1915559478  -0.0537876942   0.3598575813  -1.1376752572   0.8521190820
## [311]  0.5899417075   1.0060607970   0.0705422262  -0.4726121260  -0.0521172858
## [316]  0.0121672909   0.7344118042   1.6747095494   0.5215678923   1.1255867959
## [321]  0.7862615153  -0.6608318149   0.0630738405   0.2768809589   0.8634129749
## [326]  0.7632914904  -0.6530627897   1.6765558091   0.9440245801   0.7909243752
## [331]  1.0860396006   1.6350767566  -0.3589951213   1.0135451298  -0.8097807386
## [336] -0.7485511869   0.0963414127  -1.0461931215  -0.3412120584   1.1084752785
## [341] -0.5219843460   1.9339280910   1.6519573729   1.3204811354   0.7060963383
## [346]  0.0754743141   0.3821220321  -2.1235955275   1.1925612973  -0.2781274596
```

```
## [351]    0.8401879386  -0.4300550321  -1.5863581755  -0.7371372337  -1.2964034862
## [356]   -0.6110105069  -0.8911846121  -0.7097042206  -0.3809029257  -1.5438082035
## [361]   -0.1255347804   0.0906626925  -0.2079821677   0.0679074131   0.6378875425
## [366]    1.5166686597  -0.5738167680  -0.7029014105   0.3215747857   1.1841530424
## [371]   -0.7706649212   1.3426432918  -0.8877779476   0.5758211632  -0.5525890475
## [376]    1.9342812732   0.9244688063  -1.1957945778  -0.8959983300   0.7916938908
## [381]   -0.1850545688  -1.5797795810   1.7034095063   0.5203030528  -0.3986048924
## [386]   -1.4156772670  -0.0007964323   1.0761122328  -0.5865580974  -1.5242342997
## [391]    1.0681546614  -0.1928280810  -0.4891155010   0.0024982770   0.7824322775
## [396]    0.4646746055  -0.9531838109  -0.7384569184  -1.5755518950   0.5342875841
## [401]    2.3604846387   0.4316962482   0.4811143181  -0.5451487605   1.0266919484
## [406]    0.1833900195   0.0032550115   0.3005067247   0.1088419965   0.8230914440
## [411]    0.0024387233   1.3345536910  -1.4322804961  -0.0681781159  -0.7820852900
## [416]    1.6301585526  -0.8882099855   0.2742438339  -0.9323515319  -0.4730624645
## [421]    0.8218104126  -0.3377947569  -0.3977234703  -0.7217684048   1.5371540898
## [426]    0.7330081566   0.5994437376  -0.4203448430  -0.4284360526  -0.4407389678
## [431]   -0.2354930734   1.2740235868  -0.2875843284   0.4098183927  -1.5246928068
## [436]    0.7890138375  -1.7244671239  -1.6006586522  -0.7216707345   0.3460742420
## [441]    0.5438976860  -0.4068610872  -0.5674418024   0.4286194343  -0.3830557928
## [446]    0.9799094323   0.2728100224  -0.5469662514  -1.9771919202  -0.4253993816
## [451]    3.1881877030  -1.4985592803   2.5088020075  -0.1719157782   1.0439833424
## [456]   -0.8950785901  -0.5084666880   1.3777942714  -1.4388236544  -2.5479690771
## [461]    0.4288255610  -1.1589290462   1.4398636577  -0.9232518086  -1.0083023582
## [466]    1.2102404758   2.1666542055  -0.8698963008   1.0536624096   0.8472787930
## [471]   -0.3757744902  -0.0027875855   1.0729575159   1.1460169622  -0.1650268667
## [476]   -0.5445071827  -0.0750855146  -1.0599626586  -1.0891038073   0.0816616903
## [481]   -1.9464986222   0.8414014339  -1.2963262935  -1.1950824414   1.1130054549
## [486]   -0.8967727661   1.4405046156  -2.2620107781   0.2382985479   0.7042625121
## [491]   -0.2083246685  -1.3003743747  -0.7532416757   2.0841313535  -0.1978858139
## [496]   -0.2745979159   0.9160907262  -0.5021425450  -0.2293167080   2.1623121945
## [501]    0.2900110480  -1.0884662783  -0.1483379927   0.8507463363  -0.5163701343
## [506]   -1.4087116190  -1.2600263790   0.6558491974  -1.1025955952   0.5941408340
## [511]    0.0600043929  -0.8178348345  -0.5475149868   0.4788681888  -0.7625167792
## [516]    2.2470516665   0.6242088583  -0.7430126261  -0.3530339005  -0.5434328798
## [521]    0.9973281593   0.6988276442   0.5875037113   0.6001782134   1.2221666714
## [526]   -0.0808273981  -1.4536195383   0.2600793250  -0.3737349855  -0.6049989692
## [531]   -0.3813055115   1.9645936532   0.4560590140  -0.2457026750   0.3802055109
## [536]    2.2747345648   0.6439141518  -0.4288957721   1.2074423185   1.4890828437
## [541]    0.6391466271   1.9784043976   0.4284434018  -0.7803975419  -0.4823350007
## [546]    1.8166648683  -0.3842657818   2.1391885944   1.0320380144   0.7059412915
## [551]    1.1326095504  -0.0058209267
```

```r
dexp(df$Confirmed, rate = 1, log = FALSE)
```

```
##  [1]   1.000000e+00   1.000000e+00   1.000000e+00   3.678794e-01   3.678794e-01
##  [6]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
## [11]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
## [16]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
## [21]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
## [26]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
## [31]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
## [36]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   2.478752e-03
## [41]   3.354626e-04   1.000000e+00   1.353353e-01   4.978707e-02   1.000000e+00
## [46]   1.353353e-01   4.978707e-02   1.000000e+00   1.000000e+00   3.678794e-01
## [51]   6.144212e-06   6.144212e-06   3.059023e-07   6.914400e-13   8.315287e-07
```

```
##  [56]   1.234098e-04  5.602796e-09  1.154822e-17  2.478752e-03  2.061154e-09
##  [61]   1.266417e-14  9.118820e-04  3.775135e-11  7.582560e-10  1.234098e-04
##  [66]   1.670170e-05  3.354626e-04  2.260329e-06  3.354626e-04  1.234098e-04
##  [71]   6.144212e-06  9.118820e-04  4.539993e-05  1.353353e-01  4.978707e-02
##  [76]   3.354626e-04  3.678794e-01  9.118820e-04  3.678794e-01  1.831564e-02
##  [81]   1.353353e-01  2.478752e-03  5.602796e-09  1.670170e-05  4.539993e-05
##  [86]   4.978707e-02  9.118820e-04  1.670170e-05  2.260329e-06  1.831564e-02
##  [91]   4.539993e-05  1.353353e-01  1.000000e+00  1.353353e-01  1.000000e+00
##  [96]   1.000000e+00  4.978707e-02  1.000000e+00  1.000000e+00  3.678794e-01
## [101]   1.353353e-01  9.118820e-04  9.118820e-04  6.737947e-03  4.539993e-05
## [106]   5.109089e-12  1.125352e-07  1.670170e-05  8.315287e-07  2.543666e-13
## [111]   6.144212e-06  3.775135e-11  3.775135e-11  5.749522e-19  1.185065e-27
## [116]   9.602680e-24  5.242886e-22  7.984904e-30  4.248354e-18  1.216099e-37
## [121]   1.185065e-27  6.470235e-26  3.221340e-27  1.758792e-25  4.473779e-38
## [126]   2.442601e-36  1.500786e-41  6.213160e-49  1.247946e-47  3.392270e-47
## [131]   3.014409e-40  3.014409e-40  5.900091e-29  8.985826e-37  1.333615e-34
## [136]   1.216099e-37  3.532629e-24  2.442601e-36  4.906095e-35  2.678637e-33
## [141]   7.471972e-43  5.665668e-52  6.991990e-56  1.733141e-58  1.167781e-60
## [146]   5.814040e-62  9.710436e-67  3.817497e-54  7.175096e-66  2.053885e-85
## [151]   5.665668e-52  1.037703e-53  1.280628e-57  2.639570e-66  3.257489e-70
## [156]   2.311343e-92 5.879283e-105  1.921948e-98  1.517627e-84 7.445621e-119
## [161]  1.893917e-131 5.945257e-148 2.155239e-181 1.159559e-212 1.207537e-189
## [166]  1.004102e-195 8.891090e-265 2.719805e-271 2.750325e-314  0.000000e+00
## [171]  2.906513e-258  0.000000e+00  0.000000e+00 2.032231e-313  0.000000e+00
## [176]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 1.334362e-305
## [181]   0.000000e+00  0.000000e+00 1.766006e-220  0.000000e+00  0.000000e+00
## [186]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [191]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [196]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [201]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [206]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [211]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [216]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [221]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [226]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [231]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [311]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [316]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [321]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [326]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [331]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [336]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [341]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [346]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [351]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [356]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [361]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [366]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [371]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [376]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [381]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [386]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [391]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [396]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [401]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [406]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [411]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [416]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [421]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [426]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [431]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [436]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [441]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [446]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [451]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [456]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [461]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [466]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [471]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [476]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [481]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [486]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [491]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [496]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [501]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [506]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [511]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [516]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [521]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [526]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [531]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [536]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [541]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [546]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [551]  0.000000e+00  0.000000e+00
```

```r
dexp(df$Recovered, rate = 1, log = FALSE)
```

```
##  [1]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [6]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [11]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [16]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [21]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [26]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
```

```
##  [31] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [36] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [41] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [46] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [51] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [56] 1.000000e+00 1.000000e+00 4.978707e-02 3.354626e-04 1.831564e-02
##  [61] 1.000000e+00 1.831564e-02 1.353353e-01 1.353353e-01 8.315287e-07
##  [66] 3.354626e-04 2.478752e-03 4.978707e-02 6.144212e-06 2.260329e-06
##  [71] 2.260329e-06 1.879529e-12 5.602796e-09 2.319523e-16 5.602796e-09
##  [76] 2.260329e-06 9.118820e-04 1.879529e-12 4.539993e-05 1.353353e-01
##  [81] 2.260329e-06 7.582560e-10 1.125352e-07 3.678794e-01 3.354626e-04
##  [86] 3.059023e-07 9.118820e-04 1.831564e-02 2.260329e-06 1.831564e-02
##  [91] 4.539993e-05 8.315287e-07 1.234098e-04 3.354626e-04 3.678794e-01
##  [96] 3.221340e-27 1.000000e+00 9.118820e-04 6.737947e-03 4.539993e-05
## [101] 3.678794e-01 1.831564e-02 1.000000e+00 1.000000e+00 3.678794e-01
## [106] 4.978707e-02 1.000000e+00 1.831564e-02 1.000000e+00 1.000000e+00
## [111] 1.000000e+00 6.737947e-03 3.354626e-04 1.353353e-01 4.978707e-02
## [116] 6.737947e-03 6.144212e-06 4.539993e-05 4.539993e-05 4.978707e-02
## [121] 4.539993e-05 4.539993e-05 3.059023e-07 1.522998e-08 5.602796e-09
## [126] 3.775135e-11 1.154822e-17 2.789468e-10 1.928750e-22 1.562882e-18
## [131] 1.670170e-05 1.713908e-15 1.758792e-25 1.185065e-27 1.266417e-14
## [136] 1.053062e-20 4.780893e-25 1.979260e-32 8.756511e-27 8.194013e-40
## [141] 2.227364e-39 2.031093e-42 1.758792e-25 4.079559e-41 6.054602e-39
## [146] 8.756511e-27 6.639677e-36 9.602680e-24 5.900091e-29 5.034575e-45
## [151] 5.749522e-19 4.906095e-35 2.678637e-33 4.711166e-58 1.872900e-88
## [156] 5.091071e-88 1.707864e-91 1.900620e-55 2.970445e-73 8.408597e-50
## [161] 2.506567e-46 1.950393e-65 2.285694e-49 7.868448e-63 4.711166e-58
## [166] 4.408531e-71 2.470010e-79 7.555819e-86 9.568814e-100 1.733141e-58
## [171] 2.534695e-89 2.001470e-75 3.961430e-107 1.007655e-119 7.445621e-119
## [176] 2.425402e-188 0.000000e+00 0.000000e+00 5.903397e-300 4.940656e-324
## [181] 1.300310e-295 7.586809e-281 0.000000e+00 0.000000e+00 0.000000e+00
## [186] 1.604710e-299 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [191] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [196] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [201] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [206] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [211] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [216] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [221] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [226] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [231] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [236] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [241] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [246] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [251] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [256] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [261] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [266] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [271] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [276] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [281] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [286] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [291] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [296] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
```

```
## [301]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [306]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [311]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [316]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [321]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [326]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [331]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [336]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [411]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [416]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [421]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [426]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [431]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [436]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```r
dexp(df$Deceased, rate = 1, log = FALSE)
```

```
##    [1] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
```

```
##    [6] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [11] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [16] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [21] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [26] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [31] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [36] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [41] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [46] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [51] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [56] 1.000000e+00 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00
##   [61] 1.000000e+00 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00
##   [66] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [71] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [76] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [81] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [86] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [91] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [96] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [101] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [106] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [111] 1.000000e+00 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00
##  [116] 3.678794e-01 3.678794e-01 1.000000e+00 1.000000e+00 3.678794e-01
##  [121] 3.678794e-01 3.678794e-01 3.678794e-01 1.000000e+00 3.678794e-01
##  [126] 1.000000e+00 4.978707e-02 1.000000e+00 3.678794e-01 1.000000e+00
##  [131] 3.678794e-01 1.000000e+00 3.678794e-01 3.678794e-01 3.678794e-01
##  [136] 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00 1.000000e+00
##  [141] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [146] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [151] 1.000000e+00 3.678794e-01 3.678794e-01 3.678794e-01 1.000000e+00
##  [156] 1.000000e+00 1.000000e+00 1.000000e+00 1.353353e-01 1.000000e+00
##  [161] 1.000000e+00 1.000000e+00 1.000000e+00 1.353353e-01 1.353353e-01
##  [166] 1.353353e-01 3.678794e-01 3.678794e-01 1.353353e-01 3.678794e-01
##  [171] 1.353353e-01 1.353353e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [176] 6.737947e-03 1.831564e-02 6.737947e-03 1.353353e-01 1.353353e-01
##  [181] 1.831564e-02 3.678794e-01 1.353353e-01 4.978707e-02 3.354626e-04
##  [186] 3.678794e-01 1.353353e-01 4.978707e-02 9.118820e-04 4.978707e-02
##  [191] 6.737947e-03 1.831564e-02 1.353353e-01 9.118820e-04 6.737947e-03
##  [196] 2.478752e-03 4.978707e-02 4.539993e-05 9.118820e-04 4.539993e-05
##  [201] 2.260329e-06 2.478752e-03 9.118820e-04 1.234098e-04 6.144212e-06
##  [206] 3.059023e-07 6.737947e-03 1.670170e-05 4.539993e-05 2.260329e-06
##  [211] 4.539993e-05 9.118820e-04 2.478752e-03 9.118820e-04 9.118820e-04
##  [216] 1.831564e-02 9.118820e-04 4.539993e-05 1.670170e-05 1.670170e-05
##  [221] 4.539993e-05 6.144212e-06 2.260329e-06 6.144212e-06 6.144212e-06
##  [226] 8.315287e-07 3.059023e-07 8.315287e-07 3.059023e-07 6.144212e-06
##  [231] 8.315287e-07 1.234098e-04 6.144212e-06 1.522998e-08 1.125352e-07
##  [236] 1.522998e-08 5.602796e-09 2.061154e-09 7.582560e-10 2.789468e-10
##  [241] 7.582560e-10 7.582560e-10 2.061154e-09 2.789468e-10 1.026188e-10
##  [246] 2.543666e-13 2.061154e-09 2.789468e-10 1.026188e-10 1.026188e-10
##  [251] 1.388794e-11 2.789468e-10 3.775135e-11 1.388794e-11 1.026188e-10
##  [256] 1.388794e-11 2.789468e-10 7.582560e-10 2.061154e-09 1.026188e-10
##  [261] 3.775135e-11 5.109089e-12 2.789468e-10 7.582560e-10 3.775135e-11
##  [266] 5.109089e-12 1.026188e-10 5.109089e-12 1.388794e-11 5.109089e-12
##  [271] 2.061154e-09 3.775135e-11 1.879529e-12 5.109089e-12 6.914400e-13
```

```
## [276] 1.879529e-12 6.914400e-13 7.582560e-10 5.109089e-12 6.914400e-13
## [281] 5.109089e-12 1.879529e-12 6.914400e-13 3.775135e-11 2.789468e-10
## [286] 6.914400e-13 2.543666e-13 1.388794e-11 5.109089e-12 5.109089e-12
## [291] 7.582560e-10 5.602796e-09 1.879529e-12 6.914400e-13 5.109089e-12
## [296] 6.914400e-13 1.388794e-11 1.879529e-12 2.789468e-10 3.775135e-11
## [301] 5.109089e-12 1.879529e-12 1.026188e-10 1.388794e-11 1.879529e-12
## [306] 7.582560e-10 5.109089e-12 6.914400e-13 3.442477e-14 2.543666e-13
## [311] 1.266417e-14 6.914400e-13 1.026188e-10 3.442477e-14 6.305117e-16
## [316] 5.109089e-12 2.543666e-13 1.266417e-14 2.543666e-13 3.775135e-11
## [321] 4.658886e-15 1.879529e-12 1.879529e-12 1.026188e-10 2.543666e-13
## [326] 9.357623e-14 1.879529e-12 1.879529e-12 2.789468e-10 2.789468e-10
## [331] 1.125352e-07 7.582560e-10 1.388794e-11 8.315287e-07 3.775135e-11
## [336] 6.914400e-13 9.357623e-14 1.026188e-10 7.582560e-10 1.388794e-11
## [341] 5.602796e-09 3.775135e-11 1.388794e-11 1.388794e-11 1.026188e-10
## [346] 2.789468e-10 1.026188e-10 2.061154e-09 1.388794e-11 5.109089e-12
## [351] 5.602796e-09 1.026188e-10 1.879529e-12 7.582560e-10 4.139938e-08
## [356] 5.109089e-12 1.522998e-08 7.582560e-10 5.602796e-09 1.026188e-10
## [361] 2.061154e-09 4.139938e-08 5.602796e-09 2.061154e-09 5.602796e-09
## [366] 2.789468e-10 1.522998e-08 7.582560e-10 4.139938e-08 1.125352e-07
## [371] 2.061154e-09 4.139938e-08 5.602796e-09 1.125352e-07 5.602796e-09
## [376] 1.125352e-07 5.602796e-09 1.522998e-08 1.125352e-07 1.522998e-08
## [381] 1.125352e-07 3.059023e-07 2.260329e-06 1.522998e-08 1.125352e-07
## [386] 8.315287e-07 3.059023e-07 2.260329e-06 3.059023e-07 1.125352e-07
## [391] 8.315287e-07 4.139938e-08 8.315287e-07 8.315287e-07 1.522998e-08
## [396] 3.059023e-07 2.260329e-06 1.125352e-07 3.059023e-07 8.315287e-07
## [401] 1.125352e-07 1.125352e-07 2.260329e-06 6.144212e-06 1.125352e-07
## [406] 8.315287e-07 2.260329e-06 8.315287e-07 6.144212e-06 3.059023e-07
## [411] 1.670170e-05 3.059023e-07 2.260329e-06 3.059023e-07 4.139938e-08
## [416] 3.059023e-07 2.260329e-06 6.144212e-06 4.539993e-05 4.539993e-05
## [421] 6.144212e-06 8.315287e-07 8.315287e-07 6.144212e-06 1.670170e-05
## [426] 1.125352e-07 3.059023e-07 1.670170e-05 8.315287e-07 6.144212e-06
## [431] 4.539993e-05 6.144212e-06 8.315287e-07 1.125352e-07 1.522998e-08
## [436] 2.789468e-10 4.139938e-08 1.125352e-07 1.670170e-05 2.061154e-09
## [441] 2.789468e-10 2.061154e-09 7.582560e-10 1.879529e-12 1.388794e-11
## [446] 7.582560e-10 6.914400e-13 2.789468e-10 6.914400e-13 1.879529e-12
## [451] 1.388794e-11 9.357623e-14 6.914400e-13 1.266417e-14 1.562882e-18
## [456] 1.425164e-21 5.242886e-22 1.425164e-21 5.242886e-22 2.862519e-20
## [461] 1.758792e-25 6.470235e-26 4.359610e-28 3.532629e-24 1.603811e-28
## [466] 2.937482e-30 5.900091e-29 4.906095e-35 5.521082e-42 7.471972e-43
## [471] 4.079559e-41 2.031093e-42 2.227364e-39 1.645811e-38 7.471972e-43
## [476] 2.285694e-49 2.572209e-56 2.138866e-62 3.665820e-77 2.252358e-82
## [481] 7.555819e-86 1.348580e-77 2.639570e-66 2.470010e-79 5.583037e-85
## [486] 1.022569e-86 1.664280e-81 2.708695e-76 5.583037e-85 3.128062e-93
## [491] 3.572270e-67 2.345551e-59 1.707864e-91 2.601073e-99 2.311343e-92
## [496] 1.404379e-54 1.778528e-68 5.583037e-85 7.362997e-76 5.440560e-75
## [501] 3.430337e-90 1.198363e-70 8.074507e-73 1.441157e-64 6.054602e-39
## [506] 8.194013e-40 1.137980e-50 2.285694e-49 1.500786e-41 5.814040e-62
## [511] 7.175096e-66 8.628801e-60 5.665668e-52 5.665668e-52 1.185065e-27
## [516] 1.688912e-48 6.813557e-46 2.138866e-62 1.404379e-54 3.917470e-64
## [521] 2.345551e-59 9.854155e-34 5.034575e-45 2.138866e-62 5.301719e-65
## [526] 2.138866e-62 3.481107e-57 4.590938e-48 7.471972e-43 3.720076e-44
## [531] 1.404379e-54 2.572209e-56 1.645811e-38 3.481107e-57 3.093350e-50
## [536] 6.639677e-36 6.470235e-26 6.813557e-46 2.506567e-46 1.037703e-53
## [541] 4.711166e-58 2.748785e-43 2.170522e-29 2.345551e-59 1.778528e-68
```

```
## [546] 1.280628e-57 2.572209e-56 4.186394e-51 1.804851e-35 4.780893e-25
## [551] 5.665668e-52 5.301719e-65
```

```r
pexp(df$Confirmed, rate = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.0000000 0.0000000 0.0000000 0.6321206 0.6321206 0.0000000 0.0000000
##    [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.9975212 0.9996645 0.0000000
##   [43] 0.8646647 0.9502129 0.0000000 0.8646647 0.9502129 0.0000000 0.0000000
##   [50] 0.6321206 0.9999939 0.9999939 0.9999997 1.0000000 0.9999992 0.9998766
##   [57] 1.0000000 1.0000000 0.9975212 1.0000000 1.0000000 0.9990881 1.0000000
##   [64] 1.0000000 0.9998766 0.9999833 0.9996645 0.9999977 0.9996645 0.9998766
##   [71] 0.9999939 0.9990881 0.9999546 0.8646647 0.9502129 0.9996645 0.6321206
##   [78] 0.9990881 0.6321206 0.9816844 0.8646647 0.9975212 1.0000000 0.9999833
##   [85] 0.9999546 0.9502129 0.9990881 0.9999833 0.9999977 0.9816844 0.9999546
##   [92] 0.8646647 0.0000000 0.8646647 0.0000000 0.0000000 0.9502129 0.0000000
##   [99] 0.0000000 0.6321206 0.8646647 0.9990881 0.9990881 0.9932621 0.9999546
##  [106] 1.0000000 0.9999999 0.9999833 0.9999992 1.0000000 0.9999939 1.0000000
##  [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pexp(df$Recovered, rate = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.9502129 0.9996645 0.9816844 0.0000000 0.9816844 0.8646647
##  [64] 0.8646647 0.9999992 0.9996645 0.9975212 0.9502129 0.9999939 0.9999977
##  [71] 0.9999977 1.0000000 1.0000000 1.0000000 1.0000000 0.9999977 0.9990881
##  [78] 1.0000000 0.9999546 0.8646647 0.9999977 1.0000000 0.9999999 0.6321206
##  [85] 0.9996645 0.9999997 0.9990881 0.9816844 0.9999977 0.9816844 0.9999546
##  [92] 0.9999992 0.9998766 0.9996645 0.6321206 1.0000000 0.0000000 0.9990881
##  [99] 0.9932621 0.9999546 0.6321206 0.9816844 0.0000000 0.0000000 0.6321206
## [106] 0.9502129 0.0000000 0.9816844 0.0000000 0.0000000 0.0000000 0.9932621
## [113] 0.9996645 0.8646647 0.9502129 0.9932621 0.9999939 0.9999546 0.9999546
## [120] 0.9502129 0.9999546 0.9999546 0.9999997 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999833 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
pexp(df$Deceased, rate = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [57] 0.0000000 0.0000000 0.6321206 0.0000000 0.0000000 0.6321206 0.0000000
##   [64] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [71] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [78] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [85] 0.0000000 0.6321206 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [92] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [99] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [106] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [113] 0.0000000 0.6321206 0.0000000 0.6321206 0.6321206 0.0000000 0.0000000
##  [120] 0.6321206 0.6321206 0.6321206 0.6321206 0.0000000 0.6321206 0.0000000
##  [127] 0.9502129 0.0000000 0.6321206 0.0000000 0.6321206 0.0000000 0.6321206
##  [134] 0.6321206 0.6321206 0.0000000 0.0000000 0.6321206 0.0000000 0.0000000
##  [141] 0.6321206 0.0000000 0.0000000 0.0000000 0.0000000 0.6321206 0.0000000
##  [148] 0.0000000 0.0000000 0.0000000 0.0000000 0.6321206 0.6321206 0.6321206
##  [155] 0.0000000 0.0000000 0.0000000 0.0000000 0.8646647 0.0000000 0.0000000
##  [162] 0.0000000 0.0000000 0.8646647 0.8646647 0.8646647 0.6321206 0.6321206
##  [169] 0.8646647 0.6321206 0.8646647 0.8646647 0.6321206 0.6321206 0.6321206
##  [176] 0.9932621 0.9816844 0.9932621 0.8646647 0.8646647 0.9816844 0.6321206
##  [183] 0.8646647 0.9502129 0.9996645 0.6321206 0.8646647 0.9502129 0.9990881
##  [190] 0.9502129 0.9932621 0.9816844 0.8646647 0.9990881 0.9932621 0.9975212
##  [197] 0.9502129 0.9999546 0.9990881 0.9999546 0.9999977 0.9975212 0.9990881
##  [204] 0.9998766 0.9999939 0.9999997 0.9932621 0.9999833 0.9999546 0.9999977
##  [211] 0.9999546 0.9990881 0.9975212 0.9990881 0.9990881 0.9816844 0.9990881
##  [218] 0.9999546 0.9999833 0.9999833 0.9999546 0.9999939 0.9999977 0.9999939
##  [225] 0.9999939 0.9999992 0.9999997 0.9999992 0.9999997 0.9999939 0.9999992
##  [232] 0.9998766 0.9999939 1.0000000 0.9999999 1.0000000 1.0000000 1.0000000
##  [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [330] 1.0000000 0.9999999 1.0000000 1.0000000 0.9999992 1.0000000 1.0000000
##  [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000
## [372] 1.0000000 1.0000000 0.9999999 1.0000000 0.9999999 1.0000000 1.0000000
## [379] 0.9999999 1.0000000 0.9999999 0.9999997 0.9999977 1.0000000 0.9999999
## [386] 0.9999992 0.9999997 0.9999977 0.9999997 0.9999999 0.9999992 1.0000000
## [393] 0.9999992 0.9999992 1.0000000 0.9999997 0.9999977 0.9999999 0.9999997
## [400] 0.9999992 0.9999999 0.9999999 0.9999977 0.9999939 0.9999999 0.9999992
## [407] 0.9999977 0.9999992 0.9999939 0.9999997 0.9999833 0.9999997 0.9999977
## [414] 0.9999997 1.0000000 0.9999997 0.9999977 0.9999939 0.9999546 0.9999546
## [421] 0.9999939 0.9999992 0.9999992 0.9999939 0.9999833 0.9999999 0.9999997
## [428] 0.9999833 0.9999992 0.9999939 0.9999546 0.9999939 0.9999992 0.9999999
## [435] 1.0000000 1.0000000 1.0000000 0.9999999 0.9999833 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
qexp(df$Confirmed, rate = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qexp(df$Confirmed, rate = 1, lower.tail = TRUE, log.p = FALSE): NaNs
## produced
```

```
##   [1]   0   0   0 Inf Inf   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0 Inf NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN Inf NaN Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0 Inf NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
rexp(df$Confirmed)
```

```
##   [1] 0.250895800 1.500285446 1.972432367 0.795572214 0.178657069 1.457253622
##   [7] 1.052950176 0.568687657 0.419200242 1.167544524 0.765094729 0.526991861
##  [13] 2.653457211 0.384787667 4.332705755 1.412357116 1.131849823 4.400237579
##  [19] 0.234247034 0.102804137 0.179486917 0.009173905 0.361825441 1.166944384
##  [25] 0.559436991 0.364130992 0.607817557 1.284364396 1.495609786 0.106528393
##  [31] 1.988970821 1.759281674 1.587926364 2.771865519 0.796605744 0.068540890
##  [37] 1.023945831 1.452836826 0.072023283 0.086930136 0.239689548 0.147774491
##  [43] 1.716806339 2.453659193 0.123875802 0.117538399 0.658736365 1.118170030
##  [49] 0.784790700 1.916098570 0.284587032 1.409160983 0.983850806 1.190901304
##  [55] 1.703542843 0.291605384 1.278020170 0.124015895 0.874843693 0.577317534
##  [61] 2.222886490 0.234430862 0.077695380 0.500939576 0.444535806 0.607972745
##  [67] 0.012324756 2.412571324 1.357863481 0.335164979 0.152048889 1.041238385
##  [73] 0.429968757 2.733397806 0.415433473 0.524386862 0.943394536 0.819091825
##  [79] 0.357636117 0.060586968 1.139906627 1.999486297 0.261567445 0.209199931
##  [85] 0.347388875 0.612001691 1.155149454 2.398179849 0.464301484 0.526903486
##  [91] 2.112129101 0.827700180 0.336059409 0.072682468 1.574078513 0.791466313
##  [97] 1.185705391 1.335238056 0.135633481 0.293475733 0.561105511 1.946895318
## [103] 0.378566377 0.845017923 0.235038370 3.528242579 0.134999414 0.063926406
## [109] 0.553684616 0.670440855 0.728270658 0.322451170 0.137969498 0.079808794
## [115] 1.046231391 1.506480290 0.136947752 0.860390867 0.017468990 0.041993596
## [121] 1.078654394 0.021305466 1.130842575 2.117700241 0.493420251 0.455006286
## [127] 0.977987695 2.849451974 0.096476299 1.752928901 1.571352106 0.542736733
## [133] 1.378942029 1.271051402 0.141715881 0.365504933 0.050926474 0.669932235
## [139] 0.068045288 0.573082067 0.239124112 2.214288625 0.984006070 0.051504097
## [145] 2.393745998 0.234827895 0.245679218 0.242760393 2.254258766 0.459614971
## [151] 0.546343904 0.498494962 0.590342604 0.012707944 1.339213755 2.166436508
## [157] 3.570800876 0.200695666 5.556129203 2.793666296 0.315110798 0.623729951
## [163] 0.139871074 2.192973818 0.810887335 0.453888170 0.819299386 1.325827925
## [169] 0.528315293 1.162219997 2.415045926 1.033555075 0.520826126 0.355896730
## [175] 0.310050916 0.054379624 0.297167279 1.870639397 0.325559639 0.248440386
## [181] 1.169022446 4.244663108 1.853323603 0.530660896 0.116581006 0.513679205
## [187] 1.389619522 0.173794259 0.013408073 0.091816159 1.312369900 1.300012837
## [193] 0.910484062 0.894861747 0.801262443 0.766311794 0.517895423 1.566238422
## [199] 0.868850267 0.968817884 0.631852204 0.670375272 2.462046666 1.658267433
## [205] 0.009557858 0.286251417 0.555146851 0.396392555 1.441266481 1.424502849
## [211] 0.634577139 0.476518198 1.605753088 0.602670719 2.463058855 0.066007866
## [217] 0.201617009 0.221113481 0.056992232 1.255718210 0.143523087 0.714279690
## [223] 1.702819861 0.574538608 0.149200249 0.146637885 0.795202676 8.062677782
## [229] 0.889272037 3.316518515 1.132572399 0.058719735 1.324833397 1.689762069
## [235] 0.298793323 0.720002064 0.153227578 1.714885451 0.371851240 0.174440637
## [241] 0.003765866 0.716953588 1.328054950 2.050496001 0.242451527 1.991860155
```

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```
## [247] 0.538967398 0.712647716 0.973326078 1.481405552 2.711272290 0.976773893
## [253] 1.437623542 0.809061230 0.729597330 1.481659003 1.971313191 0.191679129
## [259] 1.392589715 1.807043879 1.879999738 0.474808684 0.024664885 1.611690354
## [265] 0.890426663 0.039768262 0.291974221 2.349645371 3.524486422 2.517615499
## [271] 0.910058183 0.406245766 3.770189618 2.382700265 0.405683459 1.778998377
## [277] 2.982531890 0.464252464 0.167734652 0.726493037 0.170315866 0.030550925
## [283] 0.862923310 0.451948960 0.426844220 0.579754628 0.826210545 0.929009883
## [289] 0.507972293 4.839580137 0.918246537 0.241238287 0.680540428 0.175422353
## [295] 2.933821669 0.033112488 0.057338468 1.801081719 0.283108169 3.859754359
## [301] 1.765199471 0.499762676 1.416740883 0.742436361 1.676380353 1.207402165
## [307] 1.477589514 1.951214604 0.637214419 1.240834821 0.541964368 0.955945983
## [313] 1.147909179 0.215800619 0.171293924 0.178992289 0.401898492 1.348898344
## [319] 4.256730605 1.130674386 0.004227161 0.774297614 0.248028527 1.452581505
## [325] 0.467591523 2.343504852 0.583939050 0.733537067 0.821300905 1.301366329
## [331] 0.336098581 1.982077351 0.156387704 0.539436440 0.607892982 0.870520237
## [337] 0.371667201 0.773124009 0.604465037 0.523832622 0.973113552 2.710168065
## [343] 1.325628420 0.352518272 0.784670303 2.061128123 0.760601313 1.823499559
## [349] 1.516972648 1.014675783 0.260227866 2.767697329 1.214206068 0.965635049
## [355] 0.299183223 0.031506536 0.941592495 2.028544638 0.531860496 2.780840963
## [361] 0.105971263 0.299913626 0.192926495 0.359638489 2.073019154 1.138261806
## [367] 0.515398335 1.727851674 0.555091410 1.033252278 0.065475315 0.894080236
## [373] 1.219304931 0.192480431 0.950210317 0.162870476 1.128709379 3.791071644
## [379] 2.285765229 2.082763366 0.963759773 0.877827022 0.653226531 1.016042438
## [385] 0.774703698 1.387018122 0.450987666 0.383049951 1.343089142 1.549742944
## [391] 0.822054384 0.099719159 0.213956736 0.692092034 0.308468013 0.754285883
## [397] 0.764633843 0.449075136 0.585866207 0.128798516 0.048016666 0.193739996
## [403] 0.275947481 0.002175742 0.072468780 0.910195404 0.610039413 1.867736168
## [409] 0.346345430 1.339517844 1.352587827 0.024856953 0.154291221 0.600687346
## [415] 4.091128636 0.267295446 0.185539107 0.439419216 0.162023004 0.597667091
## [421] 0.468850682 0.563711572 0.928639208 1.728282355 2.929066941 0.770110927
## [427] 0.020785359 0.735071719 1.907713797 1.223198393 0.389555011 2.179770683
## [433] 2.693613814 2.554544026 0.206598355 0.134200451 1.432720793 0.876228543
## [439] 0.321142085 0.602578588 1.156845542 0.786137019 0.008986491 1.297604865
## [445] 1.360273500 1.190401986 0.649590168 0.448871619 0.147939102 2.678861643
## [451] 0.213888016 0.564067543 0.188776961 0.382772906 1.420751826 0.540983440
## [457] 0.046605978 0.616197348 1.205121579 0.282388646 1.323453525 0.608496767
## [463] 1.067957933 0.027349663 0.710669891 0.235631680 0.876573812 1.153189388
## [469] 0.846520958 0.799883222 1.609250324 2.147719356 0.035753714 0.335422040
## [475] 2.148689605 0.090966131 0.912394799 0.386107708 0.224671428 1.660250219
## [481] 1.293474666 1.517327543 0.214552522 1.086387003 0.818425467 2.104713013
## [487] 0.228427288 1.138523690 2.328381447 1.113338743 1.388633300 2.043879593
## [493] 0.655681121 0.541852783 1.027457338 0.379481486 0.010090821 4.423926104
## [499] 0.954208054 0.887873609 0.204804617 0.005099067 0.163088190 3.944451412
## [505] 4.825343240 0.667196138 1.329558673 0.284243302 0.618674356 0.090404201
## [511] 2.561355760 0.712502755 0.093276604 2.950214505 0.978906732 0.649878928
## [517] 0.355530536 0.249393508 0.621378660 1.757045224 1.110850214 0.054200463
## [523] 0.259741091 0.282468311 0.574638772 1.568077041 0.561272163 0.029653442
## [529] 0.434695915 0.334381723 0.440253202 0.075988310 1.371457363 0.139108373
## [535] 1.401942965 2.286367779 0.039079739 0.111407308 0.849452918 1.694487756
## [541] 0.055187395 0.851615969 0.236770717 0.244530775 0.845671714 0.068882148
## [547] 0.152006261 0.439584990 1.736524595 3.255112246 0.599427448 0.229909671
```

```
rexp(df$Recovered)
```

```
##   [1] 0.466715149 0.206433272 0.451267103 0.395208734 0.136998124 1.768314542
```

```
##    [7] 0.934197770 0.381592859 2.706780063 0.282268504 1.355129510 0.400219078
##   [13] 0.244026542 0.276227412 0.411825445 0.833440729 1.900685046 1.713190738
##   [19] 2.245366899 0.427091558 0.267163657 0.611356014 0.088108977 0.128923962
##   [25] 0.102175635 0.634075229 0.274739877 1.768806518 0.929537097 0.814447757
##   [31] 0.187275605 1.269596653 0.133700734 0.124918185 1.289442835 1.582335634
##   [37] 0.920088546 0.641816613 0.561956518 0.926220134 0.303288288 0.329086194
##   [43] 1.111340552 1.837840319 0.257905936 1.134482303 1.479026644 0.308406391
##   [49] 0.928964073 0.434417814 3.674083954 1.704353969 0.048870861 1.575457141
##   [55] 1.186911521 0.114558972 0.272242852 1.207788678 2.035956353 0.855564368
##   [61] 2.419560279 0.774550942 0.390834997 0.247721279 0.075479931 1.080031161
##   [67] 0.215702945 0.543499538 1.320491949 0.718869128 0.143850608 0.994598241
##   [73] 2.391355624 0.433240058 0.339253277 0.446427593 0.100719215 0.639460147
##   [79] 0.153957949 0.127821964 0.104600705 0.402895858 0.174706934 0.120084828
##   [85] 0.123184799 1.232539017 0.184360346 1.080834347 1.648880681 1.289837746
##   [91] 0.356049404 0.321762333 0.361737633 0.755998110 2.046035876 4.660245282
##   [97] 0.460443508 0.189937197 0.910332637 1.514479633 0.684283697 0.397245983
##  [103] 0.979736747 0.366644933 0.049691941 2.328059478 0.226066362 0.431970024
##  [109] 1.402834301 1.833491407 0.287745134 0.126508291 0.162118047 0.573343901
##  [115] 0.525871040 0.159671299 0.284189682 3.700486144 0.889348259 0.887532772
##  [121] 2.024079937 0.525570821 2.182426805 1.076810745 0.806454726 0.978976116
##  [127] 0.298794425 1.957155818 0.937569832 2.183094507 0.477262968 0.539380213
##  [133] 2.224520292 0.071879516 2.457816174 1.526960388 1.712509518 2.297235287
##  [139] 1.711395938 0.884793679 0.773961456 0.958738967 0.191810666 1.040744161
##  [145] 0.094354445 2.294510359 1.492227727 1.761383213 0.940996992 2.169369386
##  [151] 0.215414574 1.271755897 1.755920244 0.691872707 0.398645907 0.342912390
##  [157] 1.972270992 0.752819446 4.847475756 1.806925196 0.028795239 2.351027198
##  [163] 0.878283523 1.065096106 0.314912746 0.751116152 0.302347121 0.368712069
##  [169] 1.796316808 0.833568726 0.571790508 0.313340056 0.533330515 1.326221083
##  [175] 1.352829091 0.935287146 4.147907411 0.955001437 0.897182393 1.006798007
##  [181] 0.385213985 1.760622889 2.294743782 0.287116524 1.998275500 0.670694586
##  [187] 0.979463644 0.522735796 0.403303887 0.304507516 0.818142279 1.295689789
##  [193] 2.571494626 1.064435526 3.579326221 2.780585885 0.006320939 0.861733641
##  [199] 1.534136121 0.998954169 0.559448454 0.161388406 0.340161797 0.060983553
##  [205] 0.984485907 0.170312346 0.139371758 0.275891408 2.837112613 1.346001835
##  [211] 0.227760258 0.938687503 0.313594534 2.466790223 0.067309668 2.592639903
##  [217] 1.218225087 5.565866881 1.125572359 1.028456115 1.763228225 0.220321572
##  [223] 1.013182939 0.242598574 0.623573936 0.483853172 3.265074029 3.342069715
##  [229] 1.683392603 2.911433958 0.430945523 2.979782469 1.302630410 0.068222425
##  [235] 0.905701022 2.124683124 0.537799253 0.586208594 0.311739160 0.612310315
##  [241] 2.108725628 0.228395707 0.056905538 2.450956975 0.866290294 0.004651192
##  [247] 1.462740032 0.037797660 0.851895465 0.879986815 1.524203239 0.387555889
##  [253] 0.585050710 2.103703779 0.803431168 3.110456637 2.190068127 1.386779069
##  [259] 1.082595944 0.296969074 0.220258304 0.406737206 0.751181054 0.129835472
##  [265] 2.335733225 2.164354361 0.148596735 0.851799604 0.673885870 2.495430228
##  [271] 0.080606441 1.648517469 0.701705474 0.145685742 0.323045913 0.514009604
##  [277] 1.413830474 0.560042038 1.561876933 1.254608546 2.183625178 1.870450316
##  [283] 1.832899816 1.563035523 1.402282806 1.274180050 1.425692840 0.270664551
##  [289] 1.573039119 1.222861698 0.142074340 1.134385688 1.431605054 0.040795636
##  [295] 1.719650930 0.458730899 1.075606033 0.954812955 3.778181230 0.101662500
##  [301] 0.596478689 1.688308310 0.452024775 0.474875007 2.871841766 0.998778572
##  [307] 1.277496790 1.828138570 0.233682569 2.260132374 0.051755003 3.006514363
##  [313] 0.138042924 0.381634048 0.290580114 0.173460149 4.697338689 2.297540864
##  [319] 0.940905371 1.354714747 0.226790320 1.374789275 0.560557465 2.202286803
##  [325] 0.067667244 1.098440679 0.569777692 2.708311936 2.755607167 0.402510684
```

```
## [331] 0.682623592 0.807845380 0.922216360 1.207747074 0.037589244 1.325206819
## [337] 1.900538199 0.117767857 0.496816819 1.863376334 0.563639533 0.197010758
## [343] 0.620802160 0.711643340 2.661978816 0.176133111 1.002060144 0.985499079
## [349] 0.128044786 1.610129379 2.113025108 0.759086088 0.558308389 0.007866635
## [355] 0.700644423 0.558953044 1.496176625 0.150644946 0.413362370 0.700382917
## [361] 0.803915957 0.102552071 0.083683877 0.390073180 0.060400558 0.112639181
## [367] 1.359498588 0.397922742 0.971449813 0.463178266 0.896444961 2.252756776
## [373] 0.150751951 0.634488909 0.352500296 0.333809114 1.514037669 2.053235926
## [379] 0.716145300 0.030360396 0.470968346 0.599157762 0.394625508 1.826540069
## [385] 0.222380241 0.156452559 0.257321559 1.377492352 3.617742901 0.220534354
## [391] 0.739078247 2.170447793 0.080143892 0.438640927 1.159618455 0.414035865
## [397] 1.530219329 2.757180819 2.015436051 0.373102981 0.125046624 0.778198313
## [403] 0.463859327 0.983614932 4.007322034 0.154447776 0.701806243 0.480411632
## [409] 0.259374560 0.163880517 2.853395752 0.672705867 1.238780318 0.682604031
## [415] 0.368998251 0.187698390 0.911631695 1.311003944 4.415814329 0.544095534
## [421] 0.279180968 3.076970123 0.020247888 1.996057298 0.642349664 3.674222020
## [427] 0.068920076 0.786550718 0.138090597 0.414005593 0.028534517 0.735407977
## [433] 0.860405424 0.466426357 0.691220590 0.065382498 0.322650964 1.567055684
## [439] 1.804100480 3.998296385 0.656668790 2.549860598 1.135722562 0.142116810
## [445] 0.057425407 0.748042889 0.475599976 1.243726756 0.064929973 0.228307284
## [451] 1.342134214 3.184689708 0.599844865 2.408498591 0.058986666 0.220901331
## [457] 0.313175618 0.999115500 0.043175129 0.002415683 0.721402886 0.015123125
## [463] 1.690777639 0.625233601 0.503169665 0.803520466 0.625886607 2.439653577
## [469] 1.362833212 0.268134873 0.227544290 2.771090960 1.263497332 0.575146319
## [475] 1.696042992 0.835759022 0.159543178 1.338179948 0.047913070 0.265518013
## [481] 0.122124591 0.118678370 0.961602542 0.811081309 2.138265440 1.626461074
## [487] 2.328114333 1.222337572 0.129306645 0.432864617 2.466202417 2.549788182
## [493] 0.401697020 0.104902495 0.419437693 2.971761264 1.228012232 0.527292668
## [499] 0.546010819 0.048261256 0.357561396 0.755887324 1.190106002 0.248344347
## [505] 2.812701340 0.135727340 0.828261302 0.418700381 1.050299204 0.140374075
## [511] 1.933369376 0.323497594 0.013979872 2.929478740 0.209642780 2.001128511
## [517] 0.916059882 1.877792332 3.121474840 0.854370231 2.457932034 3.794937494
## [523] 1.442773204 2.226214303 0.073471440 1.944194386 0.648703760 1.283269680
## [529] 2.608506912 1.529312536 2.532052571 3.252125591 1.127283595 0.745844463
## [535] 0.874274598 0.870904911 1.461152827 0.291596324 0.811300448 1.238962759
## [541] 2.539671971 2.105877137 0.737454298 0.118891212 0.014527231 0.138804462
## [547] 0.398240225 0.365069436 0.969797916 2.676868277 1.763572017 1.390882593
```

`rexp(df$Deceased)`

```
##   [1] 1.277238362 2.219516251 1.142670973 1.192192886 1.325584156 0.671875178
##   [7] 0.004449720 0.812340568 0.040768714 1.122565952 2.604769677 2.209439186
##  [13] 4.301008034 1.985828847 0.294674365 0.627992410 3.211537547 0.511133685
##  [19] 3.920954427 0.118157016 0.499660422 0.652120347 0.257487224 0.701151502
##  [25] 0.797954578 1.458353944 0.741503584 0.562941019 0.076892109 1.506116498
##  [31] 0.075905537 0.003647507 0.141403432 0.823456522 1.048695229 5.622812137
##  [37] 0.507281317 0.741344481 3.880035853 0.049405716 0.025283537 0.293526733
##  [43] 0.454784614 1.748483665 1.874363381 0.280038143 0.170067696 0.091057624
##  [49] 1.171129757 1.099881282 0.055941827 1.197666809 1.692712950 0.162114224
##  [55] 0.467043903 1.338279922 1.564281292 0.182318700 0.180580218 0.830505098
##  [61] 0.256571366 0.136684682 1.622645267 3.292612739 1.528080093 0.408682938
##  [67] 0.433452301 0.254923393 0.973351226 1.569151334 1.144148835 0.664134220
##  [73] 0.764027632 0.134700196 0.435201148 0.758067084 0.587075621 0.110398545
##  [79] 2.747073622 0.085927985 0.826931396 0.022874695 2.385179123 1.813458858
##  [85] 0.060834285 2.638406964 0.721277925 0.695722683 0.160157661 0.298550086
```

```
##   [91] 0.665733118 0.850917166 1.305316270 0.503855897 1.027432582 0.192827915
##   [97] 1.779378831 1.136414510 0.501300578 0.321092329 0.699576337 1.098882826
##  [103] 1.580518296 0.299095026 4.128802573 0.344128390 0.682378976 0.342928140
##  [109] 0.296705279 1.634856751 2.000460777 0.033112726 1.656210588 0.334455039
##  [115] 0.060482783 0.337416444 1.800789067 1.251866837 0.358006358 0.110431247
##  [121] 0.054589317 0.220605559 0.705596679 1.469016996 0.363400603 0.320504834
##  [127] 0.974147041 0.243927686 0.546892817 0.293935779 0.072671497 0.307731761
##  [133] 1.697216181 1.477168515 0.759691716 2.496256063 1.168455537 0.027764512
##  [139] 0.279652835 0.011374744 0.233248894 1.575876752 1.362691840 0.486944782
##  [145] 1.273275570 0.108145969 0.399648172 0.241301992 0.827746731 1.868428448
##  [151] 0.179441198 0.029830683 1.052965975 5.078295635 2.360229118 0.207042440
##  [157] 0.670719394 0.187668906 0.917543397 1.945888322 1.226864130 5.128061349
##  [163] 0.697256695 0.084129609 0.252421741 0.346833440 0.829634735 0.902266177
##  [169] 1.270013303 0.698407772 1.100899122 1.080267969 0.119776533 0.080670112
##  [175] 0.712646819 2.411786390 0.238192447 0.656132613 0.668510592 1.779308353
##  [181] 0.512787186 0.959689909 0.615856655 0.295813880 0.038622482 0.437954481
##  [187] 0.213226194 0.317147248 0.831315067 0.318507845 0.986823695 1.252094886
##  [193] 4.607438851 0.569118004 0.694549179 0.068397685 0.142605727 1.318612452
##  [199] 1.702597424 1.060751165 2.006036188 2.272520492 2.455011099 0.450300274
##  [205] 0.003334821 0.064420444 1.455381028 0.144662264 0.121852597 0.296644745
##  [211] 0.581625769 2.708388329 0.247314229 1.470328844 1.949639762 0.718288113
##  [217] 0.538890061 1.589859183 0.034548245 0.151818408 1.619481323 0.537750934
##  [223] 1.078179542 0.808581558 2.147647677 0.539470078 0.011246350 0.007172274
##  [229] 0.878576528 0.305107000 1.268773947 0.243339128 0.196008574 0.150043334
##  [235] 0.090642636 0.481848165 2.617909504 0.523295534 0.371413178 0.215602886
##  [241] 0.768014751 0.243284934 0.713827306 0.605965344 2.005887041 0.498840383
##  [247] 1.095139238 1.875364680 2.099203480 1.129943397 0.336710410 1.332558200
##  [253] 1.667201629 1.369165695 0.222316135 0.408621209 0.009234623 1.080824996
##  [259] 1.185854352 1.203628353 0.191478162 1.021997569 1.459734056 0.444595790
##  [265] 3.457602553 0.789734250 1.382235844 3.689252069 1.173661196 0.288057479
##  [271] 1.933693360 1.027470751 0.904970570 0.009488901 1.280281991 2.412415108
##  [277] 2.964040346 0.008193320 0.199011194 0.043955386 1.796617465 3.298083544
##  [283] 0.092860909 0.246645413 0.128681155 0.346934228 0.976300390 0.375796654
##  [289] 2.225438135 1.585051162 0.686824387 0.749595789 0.107060646 1.115901466
##  [295] 0.641044243 0.925421609 0.143031707 1.039248764 0.096579509 1.496317627
##  [301] 0.759516113 0.283428991 0.827840924 5.335183536 0.341311598 1.199541100
##  [307] 0.541826467 0.042134667 0.733546782 1.593428193 0.007137340 0.539783357
##  [313] 0.211451996 0.077014660 4.496761311 0.595998477 3.639088526 2.748370750
##  [319] 0.514704346 0.274141259 0.521935135 0.932715567 1.926318094 0.094777713
##  [325] 1.777239786 2.853452087 0.413906247 0.119553250 0.060185744 0.190847563
##  [331] 0.019937801 0.924351148 2.332814505 2.823269270 0.595588461 1.519486680
##  [337] 0.024692570 0.409360400 0.197999769 0.291318315 0.052953081 3.103337049
##  [343] 3.879333069 1.204845506 0.028449068 1.515887532 1.874416092 1.379171303
##  [349] 0.270636190 0.137844256 0.884258551 1.308908110 0.106875601 0.148003267
##  [355] 1.090254931 1.798856525 0.482982804 2.536648093 0.939023513 0.833367017
##  [361] 0.377470803 0.496596190 0.249510233 0.438455539 1.148113179 0.368356355
##  [367] 0.276095377 1.265913335 0.070714411 0.303518692 1.029396247 3.662991997
##  [373] 3.566978342 1.075733650 2.026722537 0.796428847 0.668270747 1.854191098
##  [379] 0.227302612 1.065209506 0.100257413 0.553368493 1.744845543 3.531401923
##  [385] 1.582525305 0.630450744 0.555436966 0.539092501 0.756327446 0.245990716
##  [391] 0.667152612 0.381767519 0.926886464 0.696142104 1.030598325 0.705975647
##  [397] 0.915332914 2.607254596 1.235116857 0.477997744 1.052094070 0.829572752
##  [403] 1.707591265 0.389033365 0.219035992 0.048373880 0.298667559 0.165381686
##  [409] 0.837871482 1.347162311 0.263727079 1.670051092 2.226547887 0.698282268
```

```
## [415] 0.119302180 0.224183311 2.884512842 0.003037152 0.202966042 0.041378137
## [421] 0.072879444 0.195220281 2.427026560 3.464635968 1.714151694 0.636068924
## [427] 0.873203292 0.755850812 0.938197536 1.217300150 0.310065047 0.258264258
## [433] 0.323314712 0.721976593 0.926113632 0.301404994 0.195165480 0.492244119
## [439] 0.548673350 1.063590224 0.015916370 0.126498020 0.515406176 0.561855651
## [445] 1.276606843 0.121385886 0.302226057 0.779163540 0.461482248 0.297274094
## [451] 0.765886039 0.043087074 0.156289602 1.157103068 0.100014397 1.682672400
## [457] 0.620905749 2.064436180 0.313132169 0.984296013 2.227042109 1.145956760
## [463] 0.344324257 0.175520132 0.359942494 0.095568380 1.107962014 0.154372204
## [469] 0.254582963 2.354977643 2.311521301 1.150739477 1.508606786 3.263799988
## [475] 0.278660206 0.007902016 2.556400710 1.983933242 0.557627636 3.256739288
## [481] 0.839620189 0.412056220 0.229416893 1.269219482 0.494369164 1.713787716
## [487] 0.163496001 0.186728515 0.350048923 1.056990338 2.116353217 0.777450176
## [493] 0.055094607 0.559529615 1.088357956 0.494869427 0.339512846 1.996578857
## [499] 1.393826067 2.415514921 0.789946247 0.842084082 0.080700889 5.693135246
## [505] 0.576358920 2.205084322 0.465042302 0.427327547 0.238481418 0.619080857
## [511] 1.210279644 0.937670135 0.053332349 1.245279878 2.847625741 0.601455152
## [517] 0.442927874 0.742119153 1.072599179 0.803513695 0.856607308 1.005204623
## [523] 0.804578538 0.699854141 1.773058716 3.102565513 0.048027086 1.065060313
## [529] 3.536938211 0.876762861 0.500957835 0.575128266 0.709202470 0.130602697
## [535] 2.251982043 1.033140651 0.390096202 1.288781507 0.550862860 0.853079137
## [541] 0.759221591 0.161533958 2.893967729 0.732303054 0.251610916 0.622320037
## [547] 2.273639487 1.525549529 2.939517081 0.275670203 0.527427932 4.809103388
```

```r
rexp(df$Confirmed,rate=2)
```

```
##   [1] 0.197822392 0.301961131 0.359166481 0.771557715 0.292698257 1.762049596
##   [7] 0.773266493 0.380222717 0.155439788 0.011338764 0.843755566 0.239472110
##  [13] 0.004695539 0.293964080 0.479126893 0.108812321 1.015340791 0.494890803
##  [19] 0.325652175 0.149429733 0.044582330 0.210437422 0.254896540 0.021989907
##  [25] 0.481592812 0.171450383 0.144373993 1.208425085 0.292822268 0.360881341
##  [31] 0.033557838 0.232324019 0.346311179 0.210206497 0.555507185 0.383374772
##  [37] 0.176030215 0.800560622 0.566059864 1.349185682 0.026879557 0.286606184
##  [43] 0.226631116 0.401391603 0.015601771 0.122549905 0.208122818 0.704066912
##  [49] 0.072968597 0.455864897 1.565987814 0.628520274 0.587555049 0.169669213
##  [55] 0.074533279 0.821995022 0.532556827 1.938857037 0.861247818 0.130587391
##  [61] 0.333624985 0.077360301 0.090979035 0.073800199 0.520613355 1.040603161
##  [67] 1.442930192 0.253964645 0.320602844 0.822758689 1.045022023 0.051291407
##  [73] 0.007357120 0.329197275 0.720308290 0.434611264 0.013169712 0.723593865
##  [79] 0.262775894 1.752569894 0.034210466 0.164734994 0.074492633 0.276897634
##  [85] 0.348580761 0.049966023 0.240289234 0.154907660 0.184110066 0.156312989
##  [91] 0.345076348 0.133844122 0.351627503 0.035988433 0.852660502 0.439405696
##  [97] 0.298860124 0.775611465 0.069679232 0.217545643 0.542516120 0.893752826
## [103] 0.632207311 0.173030732 0.680536485 0.029597563 0.745346770 0.924696987
## [109] 0.191919431 0.944718067 0.264111810 0.132987397 0.034446957 0.028337859
## [115] 0.520619313 1.162953253 0.023525430 0.084467329 1.222050943 1.432280097
## [121] 0.345394725 0.790214031 0.038469343 0.055892888 0.546625383 1.077940243
## [127] 0.236270725 0.951953128 1.588312279 0.542144479 0.721449667 0.193887007
## [133] 0.363710096 1.082746766 0.269307799 0.431564627 1.551383275 0.602651838
## [139] 0.415718336 0.830911797 0.383031178 4.250183094 0.658527188 0.003368086
## [145] 0.480104636 1.031372908 0.284916606 0.409134223 1.356467719 0.104354228
## [151] 0.079405189 0.144567959 0.021096667 1.102282752 0.759599044 1.337162067
## [157] 0.087640828 0.403313222 0.361694325 0.176295586 0.997646227 0.174501888
## [163] 0.185889868 0.475523636 1.425942585 0.459120983 0.159756799 0.431939317
## [169] 0.509456425 0.521771250 0.185852685 0.161353213 0.158989653 0.698459712
```

```
## [175] 0.287484475 0.872643901 0.395266436 0.232131853 0.044757971 0.098541071
## [181] 0.046672104 1.111276083 0.629785423 0.403954014 1.522906817 0.218514240
## [187] 0.546110714 0.398645662 0.465894225 0.220361586 0.572117384 0.122046310
## [193] 0.091659673 0.446994255 0.294288752 0.734760330 0.513437918 0.734074282
## [199] 0.260401147 1.550170969 0.475007350 0.060525300 0.589353430 0.650610752
## [205] 0.763750150 0.870338274 0.351386394 0.817738327 0.823099696 0.121068489
## [211] 0.413668034 0.255044078 0.432241370 0.571069011 0.091640775 0.496703647
## [217] 1.511028513 0.347665690 0.016055710 0.302128417 0.238501009 0.499615785
## [223] 2.259626159 0.139647997 0.926207855 0.996653926 0.562580641 1.598394751
## [229] 0.239665467 0.441520274 0.235088401 0.688492013 0.042514289 0.045801830
## [235] 0.074636870 0.672639390 0.099967389 0.018458291 0.488841430 1.569170080
## [241] 0.245259614 0.206340744 0.114226843 0.160479129 0.056462759 0.336587302
## [247] 0.080691263 0.073442499 1.394805238 1.281559096 0.193421068 0.123449585
## [253] 2.230408484 0.130643982 0.267686227 0.188766608 0.131462685 0.398513757
## [259] 0.346720476 0.448389838 0.500642857 0.703462556 0.013838079 0.791186668
## [265] 0.118953277 0.601990559 1.236677496 0.427879046 0.847339526 0.687093729
## [271] 0.253461007 0.502500194 0.387129896 0.396477337 0.105494765 0.348141326
## [277] 0.324835818 1.115941471 0.100858725 0.427921032 0.316058282 2.054287913
## [283] 0.248447045 0.023176030 0.517423622 0.675232175 0.635259406 0.054358480
## [289] 0.043536262 1.806057842 0.103747099 1.047374607 0.133762175 0.097773507
## [295] 1.468071110 0.063509280 0.027311097 0.421336824 0.058117395 0.697724053
## [301] 0.595210007 0.110629353 0.283762703 2.716976696 0.458005890 0.156200819
## [307] 0.491353877 0.090058447 0.808793506 0.351114694 0.567592631 0.847930435
## [313] 0.396348203 0.454582920 0.024558428 0.227805154 0.014292068 0.195523817
## [319] 0.016698100 0.355316128 0.073595286 0.240305270 0.897625581 0.190695074
## [325] 0.348324353 0.633081448 1.180075213 0.025775852 0.192582850 0.009625321
## [331] 0.075853619 0.410102775 0.002061227 0.758048417 0.943005440 0.046157028
## [337] 0.294245992 0.430847727 0.225642054 0.539018227 0.324590660 0.304100005
## [343] 0.433456947 0.976747243 0.005606431 0.257752453 0.138439119 0.672088168
## [349] 1.127288053 0.188449269 1.475987222 0.022210709 0.248624316 0.491202317
## [355] 0.596275872 0.131020608 0.703145185 0.058359191 0.666437698 0.235513564
## [361] 0.636004144 0.599963211 0.326312931 0.135655625 0.114900153 0.923283687
## [367] 0.330897693 0.098345810 0.291785473 1.561630376 0.234934721 0.130546776
## [373] 0.127491411 0.793443123 0.212577556 0.098259519 0.513713382 0.037910409
## [379] 0.066977929 1.306137518 0.112749475 0.386636643 0.189383892 0.027340779
## [385] 0.933880147 0.154341653 0.330947917 0.223626219 0.353325670 0.180870780
## [391] 1.011320339 0.473413215 0.188792791 0.531620178 0.869186296 0.139239594
## [397] 0.390962629 0.025045373 0.759227248 0.650381031 0.784608640 0.251294161
## [403] 0.263038509 0.020227395 1.761007178 0.171008012 1.161982302 1.209041097
## [409] 0.530888904 0.854674317 0.390919623 0.979495245 0.427949410 0.983483232
## [415] 2.041214171 0.125917153 0.419106616 1.531833074 0.313829420 0.617111587
## [421] 1.592892140 1.132700899 0.390346902 1.071275807 0.008630092 0.306410698
## [427] 0.428468810 0.127342054 0.313211649 0.173139057 0.393975108 1.146117258
## [433] 0.251803643 2.011483746 0.157021003 0.905770875 0.250052068 0.232286376
## [439] 0.304854731 0.728934798 0.079422936 0.119683446 0.540396400 0.101827825
## [445] 1.063826112 1.594414689 0.101969296 0.549189456 0.002754909 0.534412853
## [451] 0.138199360 1.123017515 1.129540111 0.823012441 1.552226439 0.294423471
## [457] 0.702488634 1.163846678 1.290343760 0.244686571 0.034729776 0.754864691
## [463] 0.189278002 0.062765554 1.832169821 0.123993618 1.280012377 0.481092692
## [469] 0.032436351 0.669423512 0.154787960 1.158681021 0.205704749 1.161916257
## [475] 0.041558845 0.069487051 1.102930508 0.283074767 0.073340331 2.206803346
## [481] 0.526181015 0.520687165 0.835143128 0.154315328 1.576187896 0.170574981
## [487] 0.431640360 0.247770576 0.605152208 1.087259912 0.267165145 0.235996373
## [493] 1.543054163 0.102122970 0.308174060 0.219259337 0.523406134 0.216043669
```

```
## [499] 0.001284644 0.059836928 0.509066373 0.072181829 0.794023706 0.183061600
## [505] 0.298222119 0.115342431 0.437688050 0.344645428 0.070494163 0.956729841
## [511] 0.341347607 0.229205845 0.491269233 0.482007481 1.309938072 0.027868638
## [517] 0.285882348 0.664066641 0.314086184 0.443900420 0.745733237 0.078724038
## [523] 0.042875698 0.257813274 0.376959667 0.030967467 0.904813711 0.276188115
## [529] 0.224917612 0.653422279 0.276952396 0.899932826 0.060605876 0.363280468
## [535] 0.155686278 0.220914854 1.205061148 0.685089421 0.467875096 0.126084987
## [541] 1.230534308 0.951211873 0.140935279 0.176187978 0.010890069 0.260480103
## [547] 0.100060705 0.612412616 1.225677189 0.382880263 0.367628780 0.601627140
```

```r
rexp(df$Recovered,rate=2)
```

```
##   [1] 0.5677144882 0.8040361208 0.1081872569 0.2448690664 0.1666861619
##   [6] 0.1837095416 0.0858201894 1.6338567211 0.0550927073 0.3154710697
##  [11] 0.1001499870 0.6419628658 0.2617933978 0.5985900229 0.1497756611
##  [16] 1.1647804962 1.2573725199 1.2697776900 0.1109309181 0.4529906725
##  [21] 0.1195336874 0.2582222458 0.4872537926 1.3504068339 1.6601754240
##  [26] 1.3689098348 0.3180277359 0.6184918750 0.5091300317 0.6765037733
##  [31] 0.7812786656 1.6007435768 1.7086379378 0.0115819776 0.1999831165
##  [36] 0.1961103441 0.7206979654 2.4507253997 0.7939657354 0.8934156447
##  [41] 0.1198397016 1.1687463531 0.1374199698 0.2567842326 0.0916323897
##  [46] 0.1169676671 0.7570048144 0.0014903865 0.4642266454 0.4123881254
##  [51] 0.2246553466 0.0826722995 0.5296286247 0.6752637257 0.4496744542
##  [56] 0.1745020810 0.7848945343 0.9311774373 0.1760722541 0.3899042685
##  [61] 4.0187194243 0.4324555173 0.6941895438 2.1022734287 1.0580959912
##  [66] 2.2081450243 0.2440883131 0.5072946045 0.2816625580 0.5850040666
##  [71] 0.8344310084 0.1633368006 0.5012955726 0.1789751269 0.8306260013
##  [76] 0.0266750120 1.8856200156 0.0016484552 0.1236742546 0.1147486113
##  [81] 0.8295361036 1.7861030129 0.8508866522 0.1573139853 0.2427408348
##  [86] 0.1144271447 0.3214647258 0.6704545119 1.4593031406 0.4624094423
##  [91] 1.4870625696 0.1157422899 0.7510317373 0.1386090697 0.1144242745
##  [96] 0.7435783622 0.0501998899 1.0695566208 0.0196757929 0.2448559913
## [101] 0.0001976416 0.0007015620 0.8438601151 0.4100258904 1.0058037731
## [106] 0.4702266790 0.1360025962 0.7638318828 0.9127586288 0.2825346594
## [111] 0.6264580777 0.6039718311 0.0438369194 0.1605570118 0.5727093643
## [116] 1.3243109853 0.4874971839 0.2527309828 0.3221430492 0.7449078532
## [121] 0.2853547663 0.8810714911 0.1491137284 0.3674162072 1.4782721371
## [126] 0.2373364747 0.2827574620 0.1466354462 0.4588175113 1.0392321609
## [131] 0.0561063443 0.1213316096 0.0356434372 0.8583097597 0.1577105839
## [136] 0.2393225141 1.0943141281 0.7102402131 0.1296134731 1.0067348703
## [141] 0.6293627438 0.8188627567 0.4384409463 0.5112041055 0.1899313729
## [146] 0.5235149204 1.0423626959 0.1797237410 0.0691299376 0.9246930542
## [151] 2.6293015115 0.2387321303 0.4100781927 0.0082253730 0.5448965729
## [156] 1.5046465247 0.4655785952 0.2348821142 0.5844191555 0.0485182530
## [161] 1.1460492087 1.3073290390 0.0747373058 0.7806669644 0.3659148636
## [166] 0.5385936731 0.2443814226 0.6837181709 0.1801877925 0.3987984778
## [171] 0.2624302802 0.5297378157 0.6747983731 0.8011072147 0.1735800495
## [176] 1.0656455503 0.3355714513 0.0426312428 0.3501530477 0.3094831745
## [181] 0.2008399069 0.0974195609 0.6011309949 0.7926249010 0.7229424409
## [186] 0.4361398406 0.0748825977 0.0536664790 0.1178850769 1.2411373803
## [191] 0.3208175001 1.3576667932 2.0855659481 3.5302829647 0.7869195649
## [196] 0.9890458714 0.4469053820 0.6171504529 0.7214697161 0.9237755145
## [201] 0.0081740599 0.1250575209 1.0146359168 0.4934698646 0.4853211138
## [206] 0.3443508432 1.5826853252 0.0788521583 0.3895392376 0.2011010319
## [211] 0.2917985967 0.2981158944 0.3019546003 0.1850947253 0.8268527472
```

```
## [216] 0.4846299281 0.3566098898 1.1501353620 0.8642249573 0.3322314867
## [221] 0.9593919217 0.0558594150 0.4170879340 1.4034528843 0.2593641186
## [226] 1.0429231701 0.4966592802 0.3328300582 0.0338174637 0.4408782734
## [231] 0.8293440044 0.7174458557 0.4843058307 0.2300271292 0.5747236199
## [236] 1.3923957496 0.4652993353 0.6877060514 0.1104198820 0.0519111361
## [241] 0.6143640983 0.2400382448 0.3635620000 0.3066084699 0.3545363858
## [246] 1.1334680176 1.7487550443 0.1920190158 0.0997806329 0.7399051799
## [251] 0.3125306682 0.0331146016 0.8555238088 1.1456127232 0.2627417826
## [256] 0.7094571329 0.0579729595 0.0550239831 0.2413359685 0.9884858308
## [261] 0.5146346688 0.0886012702 0.3229919807 0.0105046538 0.2964556615
## [266] 0.3905500828 0.2264922906 0.3078930611 0.4164927933 0.0593697837
## [271] 0.8257074486 1.0288819186 1.1781070674 0.1608694314 0.6250951085
## [276] 0.2363609137 0.4457040872 0.0083185881 1.6662676632 0.3633933113
## [281] 1.2307354707 0.0705257894 0.7284759127 0.7148790806 0.4858363098
## [286] 1.3617535391 0.2729176013 0.5479266369 0.3722929060 0.5692777303
## [291] 0.1525379103 1.0647334782 2.2160967382 0.7568373605 1.7705759507
## [296] 0.7648675712 0.0326413951 0.0442904853 0.2605718181 0.9331706585
## [301] 0.5935487458 0.5113889682 0.0737861635 0.0435689639 0.2433742464
## [306] 1.5443929172 2.6948424763 0.7906223936 0.0902820410 0.0254035772
## [311] 1.7707588252 0.2398627987 0.2484760976 0.3066868593 0.0245492915
## [316] 0.1194992012 0.1620453749 0.0243720916 1.8508965325 0.7552270125
## [321] 0.9936186886 2.4509881649 0.1708670501 0.0416973447 0.3310860705
## [326] 0.1925756382 0.4008502913 0.2425575845 0.5042200521 0.0280805114
## [331] 0.0116958441 0.6475240746 1.2373931808 0.3622362474 0.0059877157
## [336] 0.0816086926 0.7996546480 1.2303704918 0.0989753017 0.1972015539
## [341] 0.2609048409 0.6397016779 0.0310667611 0.5461746678 0.8719520933
## [346] 1.2221668166 0.0458292004 0.2222812015 0.5466083027 0.5289301341
## [351] 0.2574046189 2.6470772778 1.4855306752 0.3383480196 0.4383938893
## [356] 0.5402502268 0.4393331669 0.8413481973 0.0457636956 1.0394834727
## [361] 1.1928733727 0.2540580006 1.3770371945 0.0063822249 0.3020365024
## [366] 0.1925296222 0.1898961738 1.4523597769 1.4042617529 0.3021996249
## [371] 0.6794460018 0.8123923810 0.1801822084 1.0771920746 0.4107137616
## [376] 0.4134433050 0.4118012115 0.5483039459 0.1929193999 0.7899201565
## [381] 0.3152480377 0.4415985663 0.7731886766 1.9982560527 0.6785033433
## [386] 0.2792722862 1.3580689364 0.0997959557 1.2041620546 0.2770223022
## [391] 1.5707531384 0.6911715409 0.1155806171 0.4447390460 0.1763001923
## [396] 0.4718349154 0.1560587771 0.6867003431 0.2471207855 0.5391507889
## [401] 0.1764530370 0.7617855938 0.3580723011 1.4110121091 0.5235382568
## [406] 0.0434485124 0.0172382744 0.2020042479 0.6222837968 0.6168690654
## [411] 0.2774910512 1.0994655499 0.1802054429 1.2858419026 0.2993790878
## [416] 0.2044766170 0.5659882235 0.2170098037 0.5349607086 0.0966554822
## [421] 0.1529901221 0.3205315822 0.9531553210 0.2454038379 0.0615720685
## [426] 0.3615362692 0.3134220529 0.0162533657 0.4352050463 0.4148297292
## [431] 0.0187424966 0.9948774036 0.4095637376 0.2097579364 0.2803295124
## [436] 0.8127362728 0.7098229508 0.8101925058 0.2924692617 0.5177247303
## [441] 1.9008946297 0.9650223013 1.8814060540 1.7831364375 0.5994340530
## [446] 0.2495574113 0.7868309176 0.2756429259 0.8181113296 0.0195663961
## [451] 0.0014017254 0.1635807189 0.2394873938 0.1790251564 0.2831557193
## [456] 0.2306743492 0.4666394943 0.1727519881 0.2944676054 0.6541913799
## [461] 0.0192595159 0.1742055761 0.1591818386 0.3538060905 0.1476309954
## [466] 0.7222753921 0.4330949206 0.0320799485 0.4739835867 0.2552116220
## [471] 0.2999516767 0.1640144067 0.0479028083 0.0563398025 0.8375599375
## [476] 0.0517388905 1.4479095464 0.6458708136 0.3376045644 0.2245457546
## [481] 0.3274451143 0.2088264958 0.0659647956 0.5295189940 0.1181611421
```

```
## [486] 0.2787832401 0.0921971353 0.3018310706 1.0085556730 0.6734569238
## [491] 0.1003040008 0.0821780656 0.0363123226 0.2199890398 0.0364631277
## [496] 0.2116760542 0.2642472072 0.2390142693 0.5265808581 0.1551744125
## [501] 0.5980846816 0.0006524853 0.4412690773 0.1413578157 0.0635999609
## [506] 0.3990097465 0.5423215148 0.0801680114 1.3731312686 0.4418323231
## [511] 1.4060286905 0.2036486408 1.6220457628 0.0704901448 0.7173449946
## [516] 0.1606055479 2.4023979696 0.3273189517 0.7880523763 0.7700210828
## [521] 0.3784659434 0.4623239562 0.0011075623 0.2797771026 0.3166288992
## [526] 0.2776025974 0.9250870393 0.0793947882 1.4595921113 0.9049886530
## [531] 0.2442240949 0.4283676869 0.0356114260 0.0149686036 0.0005719142
## [536] 0.5051307659 0.0543807899 0.0330777494 0.6433902602 0.4633176806
## [541] 0.2808356492 1.1896185343 0.2104325942 0.6603234964 0.0370029156
## [546] 0.7458900492 0.0132628019 0.0196785158 0.4963676911 0.6071574259
## [551] 0.1303341581 1.6438062637
```

```r
rexp(df$Deceased,rate=2)
```

```
##   [1] 1.105243e+00 1.984121e-02 5.899743e-01 4.041341e-01 2.047693e-01
##   [6] 1.981322e-01 1.487100e-01 4.663024e-01 1.971179e-01 2.991625e-02
##  [11] 1.083116e+00 8.424529e-01 4.516892e-01 2.186909e-01 2.542273e-01
##  [16] 1.097027e+00 4.549057e-01 2.076402e-01 4.301061e-01 6.017305e-01
##  [21] 9.111355e-02 1.302694e-01 8.414589e-02 1.742729e-01 6.886135e-05
##  [26] 6.108186e-01 2.595566e-01 3.022087e-01 8.033668e-02 5.058633e-01
##  [31] 1.390931e+00 6.863574e-02 1.121199e+00 9.086098e-01 2.500431e-01
##  [36] 6.038108e-01 1.189860e-01 2.795787e-02 1.246582e+00 1.631472e-02
##  [41] 3.479845e-01 4.145308e-02 4.087802e-01 5.224590e-01 6.188809e-02
##  [46] 1.768100e-01 7.682041e-01 8.643627e-01 3.298529e-01 7.432030e-01
##  [51] 6.701799e-02 1.281208e-01 5.072181e-02 8.710855e-02 2.824498e-01
##  [56] 6.381425e-02 2.867608e-01 3.116898e-01 1.234784e-01 7.113454e-01
##  [61] 5.835847e-01 2.931219e-01 3.379188e-01 2.273280e-02 3.361382e-01
##  [66] 1.318042e-01 4.905796e-01 1.343146e-01 8.456150e-01 3.561453e-01
##  [71] 1.148091e+00 1.136634e-01 3.790122e-01 4.892483e-01 3.157891e-01
##  [76] 8.572933e-02 2.605715e+00 4.840264e-01 7.242097e-01 5.676000e-01
##  [81] 4.727314e-01 1.966722e+00 1.731755e+00 2.295278e-02 5.295123e-01
##  [86] 1.767669e+00 1.357049e+00 9.698861e-02 1.243731e-01 8.316269e-01
##  [91] 2.562858e-01 8.493706e-01 1.440785e-01 4.961102e-01 5.394277e-01
##  [96] 3.265790e-01 3.090570e-02 1.232087e-01 6.430552e-01 3.170049e-01
## [101] 2.990566e-01 7.319434e-01 3.185992e-01 7.774358e-01 3.081177e-01
## [106] 3.265597e-01 1.496007e-01 2.600067e-01 1.599139e-02 2.268975e-01
## [111] 3.100695e-01 2.931674e-01 3.377892e-01 5.076686e-01 4.883479e-01
## [116] 1.391993e+00 4.469702e-01 3.171282e-02 1.632497e-01 2.409017e-01
## [121] 3.839050e-01 1.047395e+00 1.638709e+00 1.216202e+00 9.162733e-01
## [126] 3.389511e-01 6.534990e-01 3.633823e-02 3.793855e-02 4.693545e-01
## [131] 1.104556e-01 1.846587e-02 2.664427e-01 1.653019e-01 5.686676e-01
## [136] 3.032832e-01 2.915424e-01 1.517650e+00 1.701973e-01 2.315413e-02
## [141] 1.040031e-01 2.119432e-01 5.366324e-01 3.604163e-02 4.614762e-02
## [146] 2.198803e-01 4.297561e-03 6.517583e-01 4.501518e-01 1.011567e-01
## [151] 1.642039e-01 4.238720e-04 5.871628e-01 3.332138e-02 5.847126e-03
## [156] 9.315114e-02 5.072860e-01 1.323097e-02 5.583044e-01 1.039865e+00
## [161] 3.138903e-01 2.534414e-01 5.608866e-01 2.507488e+00 1.230203e-01
## [166] 6.645154e-01 8.133861e-01 5.462553e-01 7.576777e-02 4.500264e-01
## [171] 1.017520e+00 5.270281e-01 1.313769e+00 6.433557e-01 7.940599e-01
## [176] 3.366157e-01 3.380852e-01 1.503689e-01 3.281794e-01 5.019463e-02
## [181] 3.652425e-01 1.666813e+00 2.442038e-02 4.501955e-01 3.149739e-01
## [186] 1.805341e-01 5.020638e-01 2.313613e-01 2.056600e-02 8.035089e-02
```

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## [191] 1.512814e+00 1.047780e+00 7.873928e-01 1.520188e+00 1.288708e-01
## [196] 6.228965e-01 1.808659e+00 1.089208e-01 1.117687e-01 2.225191e-01
## [201] 2.534120e-02 1.801951e+00 3.735539e-01 1.647832e-01 5.252158e-01
## [206] 1.980036e-01 6.241953e-01 3.722448e-01 9.367532e-01 4.655148e-01
## [211] 3.398469e-02 9.957728e-01 3.089887e-01 1.192072e+00 1.612476e-01
## [216] 1.579063e+00 1.828899e-01 6.181185e-01 2.072193e+00 1.974557e-01
## [221] 7.675260e-01 2.398778e-01 1.015662e-01 9.170956e-02 2.840172e-01
## [226] 1.190409e+00 5.188247e-01 8.155759e-01 8.779574e-01 2.887227e-02
## [231] 2.799021e-01 3.672672e-01 4.430738e-01 8.982771e-02 1.766091e+00
## [236] 6.976977e-01 3.928211e-01 2.150641e-01 1.897735e-01 1.249060e+00
## [241] 1.399588e+00 1.122121e+00 4.686781e-01 6.019843e-01 1.066463e-01
## [246] 3.722068e-01 2.455777e-01 4.352995e-01 2.817153e-01 1.496017e-02
## [251] 1.773866e-01 1.086660e+00 1.186742e-01 3.109176e-01 1.856939e-01
## [256] 8.801831e-02 1.620362e+00 9.676836e-01 3.494265e-01 2.113325e-01
## [261] 5.390676e-02 1.371132e+00 5.217426e-01 2.569667e-01 2.022736e-01
## [266] 1.667700e+00 5.122778e-01 5.364302e-02 6.295937e-01 2.645394e-01
## [271] 1.370527e+00 2.534120e-01 2.215254e-01 4.205907e-01 9.105974e-02
## [276] 8.496464e-01 4.633528e-01 1.536082e-01 4.263594e-01 4.472758e-01
## [281] 3.030423e-02 8.827145e-01 1.715204e-02 3.667247e-02 2.765749e-01
## [286] 1.864669e-01 1.365565e+00 1.256267e-01 7.746539e-01 4.055119e-02
## [291] 1.031725e+00 6.662679e-01 1.054027e+00 4.758993e-01 4.813250e-01
## [296] 1.833387e-01 7.229739e-01 1.309495e-01 1.386114e-01 4.952129e-01
## [301] 8.911455e-01 1.348236e-01 2.936777e-01 9.111021e-01 3.867305e-02
## [306] 1.676750e-01 1.673730e-01 1.684204e+00 5.110820e-01 2.560416e-01
## [311] 5.454163e-01 6.384454e-01 4.815016e-01 4.964590e-01 1.543380e-01
## [316] 1.465276e+00 5.084295e-01 6.351136e-01 4.174602e-01 8.474677e-01
## [321] 1.353172e-01 3.339184e-01 1.128683e-02 6.824908e-02 1.940224e-01
## [326] 1.660289e-01 2.345594e-01 5.441786e-01 1.393386e+00 3.741668e-01
## [331] 2.494730e-01 1.500902e-01 1.373629e+00 4.264111e-02 3.871498e-02
## [336] 1.977529e-02 2.590368e-02 2.318570e-01 1.177596e-01 5.800029e-01
## [341] 7.461200e-01 5.475739e-01 8.015431e-01 1.505898e-01 2.006219e-01
## [346] 3.067628e-02 3.268861e-01 8.753082e-02 5.504124e-01 4.188298e-01
## [351] 3.576902e-01 3.621963e-01 1.721991e-01 3.943017e-01 9.082493e-02
## [356] 1.872469e-02 8.409756e-01 2.005503e-01 3.169782e-01 1.693248e-01
## [361] 2.932252e-01 9.387804e-01 2.991009e-01 5.104122e-01 9.288765e-01
## [366] 3.660737e-01 1.234339e-01 2.209389e-01 5.677576e-02 8.273893e-01
## [371] 1.874040e-01 2.858386e-01 5.093518e-01 1.279396e+00 1.006220e+00
## [376] 3.013560e-01 1.743363e-01 3.580968e-02 7.980705e-01 1.353253e+00
## [381] 2.135460e-01 1.778340e+00 1.675566e+00 1.914816e-01 3.051617e-01
## [386] 4.665640e-02 3.523571e-01 7.556211e-02 6.196385e-01 1.133567e-01
## [391] 1.062843e-01 4.763008e-01 4.406934e-01 2.185861e-02 1.690895e+00
## [396] 7.284870e-02 1.813560e+00 2.333460e-01 8.184571e-01 5.287597e-02
## [401] 1.142462e-01 1.180908e+00 4.500292e-01 1.203843e+00 3.446269e-01
## [406] 3.825146e-03 1.871610e-01 5.365742e-01 1.667372e-01 1.651558e-01
## [411] 2.456951e-01 1.321516e+00 6.356313e-02 9.371989e-02 4.890366e-01
## [416] 1.008055e+00 2.954744e-01 2.079081e-02 3.087866e-01 2.991525e-01
## [421] 8.948557e-01 3.219807e-01 2.951375e-01 1.018583e-01 7.363275e-02
## [426] 3.424892e-01 1.991378e-01 1.065411e+00 1.339423e-01 1.159631e-01
## [431] 4.639964e-01 1.480356e-02 1.067853e-01 1.692782e+00 1.409180e-01
## [436] 4.175917e-01 2.265740e-01 1.301584e-01 1.264740e-01 7.462806e-02
## [441] 5.811633e-01 8.321510e-01 1.721015e-02 2.765354e-01 2.551573e-01
## [446] 7.666321e-02 2.795566e-01 1.286517e-01 5.257315e-01 1.321023e-01
## [451] 1.144485e+00 3.397454e-01 5.199997e-01 1.722832e-01 9.997822e-02
## [456] 1.046246e-01 4.978934e-02 1.396649e+00 2.448930e-01 4.852209e-01
```

```
## [461] 9.253281e-01 2.023495e+00 1.072682e-01 1.873167e+00 3.290428e-01
## [466] 3.930694e-01 1.312835e-01 3.339603e-01 5.287718e-01 1.486795e-01
## [471] 9.514965e-01 1.078942e+00 2.939646e-01 7.043537e-01 8.236626e-01
## [476] 2.682896e-02 3.803827e-01 1.341809e-01 5.061486e-01 1.079062e+00
## [481] 6.687263e-02 3.706914e-01 8.293507e-01 5.026728e-01 1.147282e+00
## [486] 1.356513e+00 1.134727e-02 7.176922e-02 1.066296e+00 6.635353e-02
## [491] 1.606763e-01 1.410209e-01 5.338793e-01 4.422072e-01 5.310228e-01
## [496] 1.435629e-01 3.566907e-01 6.167931e-02 8.988444e-01 9.606765e-02
## [501] 2.839933e-01 2.729934e-01 6.295803e-01 1.198718e-02 4.448737e-02
## [506] 3.800589e-01 1.614333e+00 5.659141e-01 1.739825e-01 1.181464e+00
## [511] 5.093246e-01 4.073242e-03 8.446988e-01 1.364093e-01 2.390349e-01
## [516] 6.812013e-01 5.011554e-01 3.151234e-01 1.034760e+00 1.860356e-01
## [521] 1.342894e+00 4.260663e-01 1.694201e-01 6.329814e-01 5.834060e-01
## [526] 6.841738e-01 8.094475e-01 6.939191e-01 1.071208e+00 3.119981e-03
## [531] 6.537101e-01 4.953269e-01 7.409371e-01 1.807654e-01 1.523625e-01
## [536] 1.398220e-01 1.069994e+00 1.826161e-01 2.804368e-01 8.140003e-01
## [541] 1.148966e+00 1.343681e-01 2.130887e-02 1.178268e+00 3.789158e-01
## [546] 4.838317e-01 1.030206e+00 9.674745e-01 1.404610e+00 1.705653e+00
## [551] 1.375843e-03 2.558185e-01
```

```
dgamma(df$Confirmed, shape=1, rate = 1, log = FALSE)
```

```
##   [1] 1.000000e+00 1.000000e+00 1.000000e+00 3.678794e-01 3.678794e-01
##   [6] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [11] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [16] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [21] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [26] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [31] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [36] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 2.478752e-03
##  [41] 3.354626e-04 1.000000e+00 1.353353e-01 4.978707e-02 1.000000e+00
##  [46] 1.353353e-01 4.978707e-02 1.000000e+00 1.000000e+00 3.678794e-01
##  [51] 6.144212e-06 6.144212e-06 3.059023e-07 6.914400e-13 8.315287e-07
##  [56] 1.234098e-04 5.602796e-09 1.154822e-17 2.478752e-03 2.061154e-09
##  [61] 1.266417e-14 9.118820e-04 3.775135e-11 7.582560e-10 1.234098e-04
##  [66] 1.670170e-05 3.354626e-04 2.260329e-06 3.354626e-04 1.234098e-04
##  [71] 6.144212e-06 9.118820e-04 4.539993e-05 1.353353e-01 4.978707e-02
##  [76] 3.354626e-04 3.678794e-01 9.118820e-04 3.678794e-01 1.831564e-02
##  [81] 1.353353e-01 2.478752e-03 5.602796e-09 1.670170e-05 4.539993e-05
##  [86] 4.978707e-02 9.118820e-04 1.670170e-05 2.260329e-06 1.831564e-02
##  [91] 4.539993e-05 1.353353e-01 1.000000e+00 1.353353e-01 1.000000e+00
##  [96] 1.000000e+00 4.978707e-02 1.000000e+00 1.000000e+00 3.678794e-01
## [101] 1.353353e-01 9.118820e-04 9.118820e-04 6.737947e-03 4.539993e-05
## [106] 5.109089e-12 1.125352e-07 1.670170e-05 8.315287e-07 2.543666e-13
## [111] 6.144212e-06 3.775135e-11 3.775135e-11 5.749522e-19 1.185065e-27
## [116] 9.602680e-24 5.242886e-22 7.984904e-30 4.248354e-18 1.216099e-37
## [121] 1.185065e-27 6.470235e-26 3.221340e-27 1.758792e-25 4.473779e-38
## [126] 2.442601e-36 1.500786e-41 6.213160e-49 1.247946e-47 3.392270e-47
## [131] 3.014409e-40 3.014409e-40 5.900091e-29 8.985826e-37 1.333615e-34
## [136] 1.216099e-37 3.532629e-24 2.442601e-36 4.906095e-35 2.678637e-33
## [141] 7.471972e-43 5.665668e-52 6.991990e-56 1.733141e-58 1.167781e-60
## [146] 5.814040e-62 9.710436e-67 3.817497e-54 7.175096e-66 2.053885e-85
## [151] 5.665668e-52 1.037703e-53 1.280628e-57 2.639570e-66 3.257489e-70
## [156] 2.311343e-92 5.879283e-105 1.921948e-98 1.517627e-84 7.445621e-119
## [161] 1.893917e-131 5.945257e-148 2.155239e-181 1.159559e-212 1.207537e-189
```

```
## [166]  1.004102e-195 8.891090e-265 2.719805e-271 2.750325e-314  0.000000e+00
## [171]  2.906513e-258  0.000000e+00  0.000000e+00 2.032231e-313  0.000000e+00
## [176]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 1.334362e-305
## [181]   0.000000e+00  0.000000e+00 1.766006e-220  0.000000e+00  0.000000e+00
## [186]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [191]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [196]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [201]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [206]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [211]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [216]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [221]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [226]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [231]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [311]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [316]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [321]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [326]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [331]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [336]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [341]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [346]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [351]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [356]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [361]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [366]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [371]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [376]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [381]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [386]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [391]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [396]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [401]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [406]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [411]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [416]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [421]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [426]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [431]   0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [436]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```r
dgamma(df$Recovered, shape=1, rate = 1, log = FALSE)
```

```
##   [1]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##   [6]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [11]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [16]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [21]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [26]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [31]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [36]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [41]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [46]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [51]   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00   1.000000e+00
##  [56]   1.000000e+00   1.000000e+00   4.978707e-02   3.354626e-04   1.831564e-02
##  [61]   1.000000e+00   1.831564e-02   1.353353e-01   1.353353e-01   8.315287e-07
##  [66]   3.354626e-04   2.478752e-03   4.978707e-02   6.144212e-06   2.260329e-06
##  [71]   2.260329e-06   1.879529e-12   5.602796e-09   2.319523e-16   5.602796e-09
##  [76]   2.260329e-06   9.118820e-04   1.879529e-12   4.539993e-05   1.353353e-01
##  [81]   2.260329e-06   7.582560e-10   1.125352e-07   3.678794e-01   3.354626e-04
##  [86]   3.059023e-07   9.118820e-04   1.831564e-02   2.260329e-06   1.831564e-02
##  [91]   4.539993e-05   8.315287e-07   1.234098e-04   3.354626e-04   3.678794e-01
##  [96]   3.221340e-27   1.000000e+00   9.118820e-04   6.737947e-03   4.539993e-05
## [101]   3.678794e-01   1.831564e-02   1.000000e+00   1.000000e+00   3.678794e-01
## [106]   4.978707e-02   1.000000e+00   1.831564e-02   1.000000e+00   1.000000e+00
## [111]   1.000000e+00   6.737947e-03   3.354626e-04   1.353353e-01   4.978707e-02
## [116]   6.737947e-03   6.144212e-06   4.539993e-05   4.539993e-05   4.978707e-02
## [121]   4.539993e-05   4.539993e-05   3.059023e-07   1.522998e-08   5.602796e-09
## [126]   3.775135e-11   1.154822e-17   2.789468e-10   1.928750e-22   1.562882e-18
## [131]   1.670170e-05   1.713908e-15   1.758792e-25   1.185065e-27   1.266417e-14
## [136]   1.053062e-20   4.780893e-25   1.979260e-32   8.756511e-27   8.194013e-40
```

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```
## [141]   2.227364e-39   2.031093e-42   1.758792e-25   4.079559e-41   6.054602e-39
## [146]   8.756511e-27   6.639677e-36   9.602680e-24   5.900091e-29   5.034575e-45
## [151]   5.749522e-19   4.906095e-35   2.678637e-33   4.711166e-58   1.872900e-88
## [156]   5.091071e-88   1.707864e-91   1.900620e-55   2.970445e-73   8.408597e-50
## [161]   2.506567e-46   1.950393e-65   2.285694e-49   7.868448e-63   4.711166e-58
## [166]   4.408531e-71   2.470010e-79   7.555819e-86  9.568814e-100   1.733141e-58
## [171]   2.534695e-89   2.001470e-75  3.961430e-107  1.007655e-119  7.445621e-119
## [176]  2.425402e-188   0.000000e+00   0.000000e+00  5.903397e-300  4.940656e-324
## [181]  1.300310e-295  7.586809e-281   0.000000e+00   0.000000e+00   0.000000e+00
## [186]  1.604710e-299   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [191]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [196]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [201]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [206]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [211]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [216]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [221]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [226]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [231]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [236]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [241]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [246]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [251]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [256]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [261]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [266]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [271]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [276]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [281]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [286]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [291]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [296]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [301]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [306]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [311]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [316]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [321]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [326]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [331]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [336]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
```

```
## [411]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [416]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [421]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [426]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [431]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [436]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [441]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [446]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [451]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [456]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [461]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [466]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [471]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [476]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [481]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [486]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [491]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [496]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [501]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [506]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [511]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [516]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [521]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [526]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [531]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [536]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [541]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [546]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [551]  0.000000e+00  0.000000e+00
```

```r
dgamma(df$Deceased, shape=1, rate = 1, log = FALSE)
```

```
##   [1]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [6]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [11]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [16]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [21]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [26]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [31]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [36]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [41]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [46]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [51]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [56]  1.000000e+00  1.000000e+00  1.000000e+00  3.678794e-01  1.000000e+00
##  [61]  1.000000e+00  3.678794e-01  1.000000e+00  1.000000e+00  1.000000e+00
##  [66]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [71]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [76]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [81]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [86]  3.678794e-01  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [91]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [96]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [101]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [106]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
## [111]  1.000000e+00  1.000000e+00  1.000000e+00  3.678794e-01  1.000000e+00
```

```
## [116] 3.678794e-01 3.678794e-01 1.000000e+00 1.000000e+00 3.678794e-01
## [121] 3.678794e-01 3.678794e-01 3.678794e-01 1.000000e+00 3.678794e-01
## [126] 1.000000e+00 4.978707e-02 1.000000e+00 3.678794e-01 1.000000e+00
## [131] 3.678794e-01 1.000000e+00 3.678794e-01 3.678794e-01 3.678794e-01
## [136] 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00 1.000000e+00
## [141] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [146] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [151] 1.000000e+00 3.678794e-01 3.678794e-01 3.678794e-01 1.000000e+00
## [156] 1.000000e+00 1.000000e+00 1.000000e+00 1.353353e-01 1.000000e+00
## [161] 1.000000e+00 1.000000e+00 1.000000e+00 1.353353e-01 1.353353e-01
## [166] 1.353353e-01 3.678794e-01 3.678794e-01 1.353353e-01 3.678794e-01
## [171] 1.353353e-01 1.353353e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [176] 6.737947e-03 1.831564e-02 6.737947e-03 1.353353e-01 1.353353e-01
## [181] 1.831564e-02 3.678794e-01 1.353353e-01 4.978707e-02 3.354626e-04
## [186] 3.678794e-01 1.353353e-01 4.978707e-02 9.118820e-04 4.978707e-02
## [191] 6.737947e-03 1.831564e-02 1.353353e-01 9.118820e-04 6.737947e-03
## [196] 2.478752e-03 4.978707e-02 4.539993e-05 9.118820e-04 4.539993e-05
## [201] 2.260329e-06 2.478752e-03 9.118820e-04 1.234098e-04 6.144212e-06
## [206] 3.059023e-07 6.737947e-03 1.670170e-05 4.539993e-05 2.260329e-06
## [211] 4.539993e-05 9.118820e-04 2.478752e-03 9.118820e-04 9.118820e-04
## [216] 1.831564e-02 9.118820e-04 4.539993e-05 1.670170e-05 1.670170e-05
## [221] 4.539993e-05 6.144212e-06 2.260329e-06 6.144212e-06 6.144212e-06
## [226] 8.315287e-07 3.059023e-07 8.315287e-07 3.059023e-07 6.144212e-06
## [231] 8.315287e-07 1.234098e-04 6.144212e-06 1.522998e-08 1.125352e-07
## [236] 1.522998e-08 5.602796e-09 2.061154e-09 7.582560e-10 2.789468e-10
## [241] 7.582560e-10 7.582560e-10 2.061154e-09 2.789468e-10 1.026188e-10
## [246] 2.543666e-13 2.061154e-09 2.789468e-10 1.026188e-10 1.026188e-10
## [251] 1.388794e-11 2.789468e-10 3.775135e-11 1.388794e-11 1.026188e-10
## [256] 1.388794e-11 2.789468e-10 7.582560e-10 2.061154e-09 1.026188e-10
## [261] 3.775135e-11 5.109089e-12 2.789468e-10 7.582560e-10 3.775135e-11
## [266] 5.109089e-12 1.026188e-10 5.109089e-12 1.388794e-11 5.109089e-12
## [271] 2.061154e-09 3.775135e-11 1.879529e-12 5.109089e-12 6.914400e-13
## [276] 1.879529e-12 6.914400e-13 7.582560e-10 5.109089e-12 6.914400e-13
## [281] 5.109089e-12 1.879529e-12 6.914400e-13 3.775135e-11 2.789468e-10
## [286] 6.914400e-13 2.543666e-13 1.388794e-11 5.109089e-12 5.109089e-12
## [291] 7.582560e-10 5.602796e-09 1.879529e-12 6.914400e-13 5.109089e-12
## [296] 6.914400e-13 1.388794e-11 1.879529e-12 2.789468e-10 3.775135e-11
## [301] 5.109089e-12 1.879529e-12 1.026188e-10 1.388794e-11 1.879529e-12
## [306] 7.582560e-10 5.109089e-12 6.914400e-13 3.442477e-14 2.543666e-13
## [311] 1.266417e-14 6.914400e-13 1.026188e-10 3.442477e-14 6.305117e-16
## [316] 5.109089e-12 2.543666e-13 1.266417e-14 2.543666e-13 3.775135e-11
## [321] 4.658886e-15 1.879529e-12 1.879529e-12 1.026188e-10 2.543666e-13
## [326] 9.357623e-14 1.879529e-12 1.879529e-12 2.789468e-10 2.789468e-10
## [331] 1.125352e-07 7.582560e-10 1.388794e-11 8.315287e-07 3.775135e-11
## [336] 6.914400e-13 9.357623e-14 1.026188e-10 7.582560e-10 1.388794e-11
## [341] 5.602796e-09 3.775135e-11 1.388794e-11 1.388794e-11 1.026188e-10
## [346] 2.789468e-10 1.026188e-10 2.061154e-09 1.388794e-11 5.109089e-12
## [351] 5.602796e-09 1.026188e-10 1.879529e-12 7.582560e-10 4.139938e-08
## [356] 5.109089e-12 1.522998e-08 7.582560e-10 5.602796e-09 1.026188e-10
## [361] 2.061154e-09 4.139938e-08 5.602796e-09 2.061154e-09 5.602796e-09
## [366] 2.789468e-10 1.522998e-08 7.582560e-10 4.139938e-08 1.125352e-07
## [371] 2.061154e-09 4.139938e-08 5.602796e-09 1.125352e-07 5.602796e-09
## [376] 1.125352e-07 5.602796e-09 1.522998e-08 1.125352e-07 1.522998e-08
## [381] 1.125352e-07 3.059023e-07 2.260329e-06 1.522998e-08 1.125352e-07
```

102

```
## [386] 8.315287e-07 3.059023e-07 2.260329e-06 3.059023e-07 1.125352e-07
## [391] 8.315287e-07 4.139938e-08 8.315287e-07 8.315287e-07 1.522998e-08
## [396] 3.059023e-07 2.260329e-06 1.125352e-07 3.059023e-07 8.315287e-07
## [401] 1.125352e-07 1.125352e-07 2.260329e-06 6.144212e-06 1.125352e-07
## [406] 8.315287e-07 2.260329e-06 8.315287e-07 6.144212e-06 3.059023e-07
## [411] 1.670170e-05 3.059023e-07 2.260329e-06 3.059023e-07 4.139938e-08
## [416] 3.059023e-07 2.260329e-06 6.144212e-06 4.539993e-05 4.539993e-05
## [421] 6.144212e-06 8.315287e-07 8.315287e-07 6.144212e-06 1.670170e-05
## [426] 1.125352e-07 3.059023e-07 1.670170e-05 8.315287e-07 6.144212e-06
## [431] 4.539993e-05 6.144212e-06 8.315287e-07 1.125352e-07 1.522998e-08
## [436] 2.789468e-10 4.139938e-08 1.125352e-07 1.670170e-05 2.061154e-09
## [441] 2.789468e-10 2.061154e-09 7.582560e-10 1.879529e-12 1.388794e-11
## [446] 7.582560e-10 6.914400e-13 2.789468e-10 6.914400e-13 1.879529e-12
## [451] 1.388794e-11 9.357623e-14 6.914400e-13 1.266417e-14 1.562882e-18
## [456] 1.425164e-21 5.242886e-22 1.425164e-21 5.242886e-22 2.862519e-20
## [461] 1.758792e-25 6.470235e-26 4.359610e-28 3.532629e-24 1.603811e-28
## [466] 2.937482e-30 5.900091e-29 4.906095e-35 5.521082e-42 7.471972e-43
## [471] 4.079559e-41 2.031093e-42 2.227364e-39 1.645811e-38 7.471972e-43
## [476] 2.285694e-49 2.572209e-56 2.138866e-62 3.665820e-77 2.252358e-82
## [481] 7.555819e-86 1.348580e-77 2.639570e-66 2.470010e-79 5.583037e-85
## [486] 1.022569e-86 1.664280e-81 2.708695e-76 5.583037e-85 3.128062e-93
## [491] 3.572270e-67 2.345551e-59 1.707864e-91 2.601073e-99 2.311343e-92
## [496] 1.404379e-54 1.778528e-68 5.583037e-85 7.362997e-76 5.440560e-75
## [501] 3.430337e-90 1.198363e-70 8.074507e-73 1.441157e-64 6.054602e-39
## [506] 8.194013e-40 1.137980e-50 2.285694e-49 1.500786e-41 5.814040e-62
## [511] 7.175096e-66 8.628801e-60 5.665668e-52 5.665668e-52 1.185065e-27
## [516] 1.688912e-48 6.813557e-46 2.138866e-62 1.404379e-54 3.917470e-64
## [521] 2.345551e-59 9.854155e-34 5.034575e-45 2.138866e-62 5.301719e-65
## [526] 2.138866e-62 3.481107e-57 4.590938e-48 7.471972e-43 3.720076e-44
## [531] 1.404379e-54 2.572209e-56 1.645811e-38 3.481107e-57 3.093350e-50
## [536] 6.639677e-36 6.470235e-26 6.813557e-46 2.506567e-46 1.037703e-53
## [541] 4.711166e-58 2.748785e-43 2.170522e-29 2.345551e-59 1.778528e-68
## [546] 1.280628e-57 2.572209e-56 4.186394e-51 1.804851e-35 4.780893e-25
## [551] 5.665668e-52 5.301719e-65
```

```r
pgamma(df$Confirmed, shape=1, rate = 1, lower.tail = TRUE,log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.6321206 0.6321206 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.9975212 0.9996645 0.0000000
##  [43] 0.8646647 0.9502129 0.0000000 0.8646647 0.9502129 0.0000000 0.0000000
##  [50] 0.6321206 0.9999939 0.9999939 0.9999997 1.0000000 0.9999992 0.9998766
##  [57] 1.0000000 1.0000000 0.9975212 1.0000000 1.0000000 0.9990881 1.0000000
##  [64] 1.0000000 0.9998766 0.9999833 0.9996645 0.9999977 0.9996645 0.9998766
##  [71] 0.9999939 0.9990881 0.9999546 0.8646647 0.9502129 0.9996645 0.6321206
##  [78] 0.9990881 0.6321206 0.9816844 0.8646647 0.9975212 1.0000000 0.9999833
##  [85] 0.9999546 0.9502129 0.9990881 0.9999833 0.9999977 0.9816844 0.9999546
##  [92] 0.8646647 0.0000000 0.8646647 0.0000000 0.0000000 0.9502129 0.0000000
##  [99] 0.0000000 0.6321206 0.8646647 0.9990881 0.9990881 0.9932621 0.9999546
## [106] 1.0000000 0.9999999 0.9999833 0.9999992 1.0000000 0.9999939 1.0000000
## [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [127]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [134]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [141]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [148]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [155]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [162]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [169]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [176]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [183]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [190]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [197]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [204]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [211]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [218]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [225]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [232]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [239]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [246]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [253]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [260]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [267]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [274]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [281]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [288]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [295]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [302]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [309]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [316]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [323]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [330]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [337]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [344]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [351]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [358]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [365]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [372]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [379]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [386]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [393]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [400]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [407]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [414]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [421]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [428]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [435]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [442]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [449]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [456]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [463]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [470]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [477]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [484]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [491]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
## [498]  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000  1.0000000
```

```
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
pgamma(df$Recovered, shape=1, rate = 1, lower.tail = TRUE,log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.9502129 0.9996645 0.9816844 0.0000000 0.9816844 0.8646647
##  [64] 0.8646647 0.9999992 0.9996645 0.9975212 0.9502129 0.9999939 0.9999977
##  [71] 0.9999977 1.0000000 1.0000000 1.0000000 1.0000000 0.9999977 0.9990881
##  [78] 1.0000000 0.9999546 0.8646647 0.9999977 1.0000000 0.9999999 0.6321206
##  [85] 0.9996645 0.9999997 0.9990881 0.9816844 0.9999977 0.9816844 0.9999546
##  [92] 0.9999992 0.9998766 0.9996645 0.6321206 1.0000000 0.0000000 0.9990881
##  [99] 0.9932621 0.9999546 0.6321206 0.9816844 0.0000000 0.0000000 0.6321206
## [106] 0.9502129 0.0000000 0.9816844 0.0000000 0.0000000 0.0000000 0.9932621
## [113] 0.9996645 0.8646647 0.9502129 0.9932621 0.9999939 0.9999546 0.9999546
## [120] 0.9502129 0.9999546 0.9999546 0.9999997 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999833 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pgamma(df$Deceased, shape=1, rate = 1, lower.tail = TRUE,log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.0000000 0.6321206 0.0000000 0.0000000 0.6321206 0.0000000
##  [64] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [71] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [78] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [85] 0.0000000 0.6321206 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [92] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [99] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [106] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [113] 0.0000000 0.6321206 0.0000000 0.6321206 0.6321206 0.0000000 0.0000000
## [120] 0.6321206 0.6321206 0.6321206 0.6321206 0.0000000 0.6321206 0.0000000
```

```
## [127] 0.9502129 0.0000000 0.6321206 0.0000000 0.6321206 0.0000000 0.6321206
## [134] 0.6321206 0.6321206 0.0000000 0.0000000 0.6321206 0.0000000 0.0000000
## [141] 0.6321206 0.0000000 0.0000000 0.0000000 0.0000000 0.6321206 0.0000000
## [148] 0.0000000 0.0000000 0.0000000 0.0000000 0.6321206 0.6321206 0.6321206
## [155] 0.0000000 0.0000000 0.0000000 0.0000000 0.8646647 0.0000000 0.0000000
## [162] 0.0000000 0.0000000 0.8646647 0.8646647 0.8646647 0.6321206 0.6321206
## [169] 0.8646647 0.6321206 0.8646647 0.8646647 0.6321206 0.6321206 0.6321206
## [176] 0.9932621 0.9816844 0.9932621 0.8646647 0.8646647 0.9816844 0.6321206
## [183] 0.8646647 0.9502129 0.9996645 0.6321206 0.8646647 0.9502129 0.9990881
## [190] 0.9502129 0.9932621 0.9816844 0.8646647 0.9990881 0.9932621 0.9975212
## [197] 0.9502129 0.9999546 0.9990881 0.9999546 0.9999977 0.9975212 0.9990881
## [204] 0.9998766 0.9999939 0.9999997 0.9932621 0.9999833 0.9999546 0.9999977
## [211] 0.9999546 0.9990881 0.9975212 0.9990881 0.9990881 0.9816844 0.9990881
## [218] 0.9999546 0.9999833 0.9999833 0.9999546 0.9999939 0.9999977 0.9999939
## [225] 0.9999939 0.9999992 0.9999997 0.9999992 0.9999997 0.9999939 0.9999992
## [232] 0.9998766 0.9999939 1.0000000 0.9999999 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 0.9999999 1.0000000 1.0000000 0.9999992 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000
## [372] 1.0000000 1.0000000 0.9999999 1.0000000 0.9999999 1.0000000 1.0000000
## [379] 0.9999999 1.0000000 0.9999999 0.9999997 0.9999977 1.0000000 0.9999999
## [386] 0.9999992 0.9999997 0.9999977 0.9999997 0.9999999 0.9999992 1.0000000
## [393] 0.9999992 0.9999992 1.0000000 0.9999997 0.9999977 0.9999999 0.9999997
## [400] 0.9999992 0.9999999 0.9999999 0.9999977 0.9999939 0.9999999 0.9999992
## [407] 0.9999977 0.9999992 0.9999939 0.9999997 0.9999833 0.9999997 0.9999977
## [414] 0.9999997 1.0000000 0.9999997 0.9999977 0.9999939 0.9999546 0.9999546
## [421] 0.9999939 0.9999992 0.9999992 0.9999939 0.9999833 0.9999999 0.9999997
## [428] 0.9999833 0.9999992 0.9999939 0.9999546 0.9999939 0.9999992 0.9999999
## [435] 1.0000000 1.0000000 1.0000000 0.9999999 0.9999833 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
qgamma(df$Confirmed, shape=1, rate = 1, lower.tail = TRUE,log.p = FALSE)
```

```
## Warning in qgamma(df$Confirmed, shape = 1, rate = 1, lower.tail = TRUE, : NaNs
## produced
```

```
##   [1]   0   0   0 Inf Inf   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0 Inf NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN Inf NaN Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0 Inf NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rgamma(df$Confirmed, shape=1, scale=1)
```

```
##   [1] 1.486985554 0.827156234 0.068213082 1.128547919 0.540823049 0.828239956
##   [7] 0.848215672 0.278080497 0.317655329 2.475388581 0.152366420 0.153476013
##  [13] 2.251520239 0.875632391 2.016997151 1.630105814 0.266718256 2.655140090
##  [19] 0.253048060 1.441569509 0.430433005 0.908162140 1.688904054 0.907954706
##  [25] 0.682366072 0.064275098 0.158374565 0.716662920 0.237776857 0.024060288
##  [31] 2.538166781 0.170309762 0.298987529 0.697638061 0.677745395 2.367680959
##  [37] 0.699761691 1.060814078 0.949270777 2.495398118 1.147799240 0.679954433
##  [43] 0.508049862 0.343839645 0.534198423 0.515468466 0.771448536 0.184910493
##  [49] 1.350955759 0.972346845 3.281518154 1.312422809 1.963949589 0.023818648
```

```
##   [55] 0.235278856 3.030057915 0.656595988 0.064919442 0.957094104 0.183610530
##   [61] 0.301670494 0.456615790 0.472000980 0.567655344 1.071227541 0.024565733
##   [67] 0.337539818 0.929885844 1.235200225 0.116538788 0.107306312 1.204218065
##   [73] 0.524699920 1.176005512 0.082858839 2.982754509 0.077986115 0.205311167
##   [79] 1.653469908 0.197403181 1.035651808 0.323844585 0.878583587 0.785691508
##   [85] 1.012027390 0.214229948 0.490918647 0.043830233 1.382392931 0.288755128
##   [91] 1.252029068 0.196532665 1.269480578 0.483265336 1.764263118 0.633881002
##   [97] 0.248378218 0.504073578 2.087797533 2.112948168 0.885125053 0.043457777
##  [103] 0.317051191 0.695031516 0.977014797 0.199592188 1.524135503 0.091021691
##  [109] 0.095566868 0.159593546 0.108596928 0.969749516 1.863188858 3.440988132
##  [115] 0.080014376 1.016708203 2.622784857 1.531357918 1.093837348 0.395695421
##  [121] 0.343137291 2.394389840 1.046657933 0.277997121 0.378472116 0.456571672
##  [127] 1.736530725 1.334956855 0.033679553 1.032464500 1.556849940 0.570606238
##  [133] 0.346943520 0.072588778 0.146101480 0.654882398 0.510529463 0.357063458
##  [139] 1.552013704 0.214002265 0.177260025 1.622394886 1.194337656 0.166404246
##  [145] 0.058947244 0.581395060 0.187761796 0.771010126 0.324878029 0.028029043
##  [151] 2.690935783 0.200479735 2.522865993 1.422939263 0.159565302 0.387410981
##  [157] 0.051394998 0.126113607 1.725913732 0.418060276 0.400180345 1.337148465
##  [163] 0.089551640 0.010459390 1.456039149 0.226687008 0.554615655 0.450375987
##  [169] 0.367342315 0.125099226 1.131246119 0.628676158 0.775741841 0.107119468
##  [175] 0.754250223 1.059576870 1.696848751 1.619252773 1.286433772 0.185959835
##  [181] 1.797680461 1.506353553 0.967653737 0.603735095 3.165315086 0.593320310
##  [187] 0.320077533 0.596788979 1.790305619 0.217888669 1.085941152 0.915631424
##  [193] 0.363872213 5.222571052 0.414622884 0.473716139 0.132224353 0.779514648
##  [199] 1.799773505 0.866058374 0.222265812 0.373539517 1.608409318 0.288894034
##  [205] 2.698620028 1.022075089 0.467223323 1.141474577 0.757641157 0.072496556
##  [211] 1.280548872 2.938444879 1.229997313 1.010574582 0.438781944 1.161898326
##  [217] 0.220602011 4.092012346 0.334720564 1.391288582 1.674765957 2.921164484
##  [223] 0.761452844 0.008746985 0.870467625 2.532681113 0.082780225 0.220146914
##  [229] 0.385623503 0.056731983 1.474747758 0.069568950 1.765564846 0.403454723
##  [235] 1.295744299 1.473142079 0.864124406 1.868903926 1.169659476 1.609022707
##  [241] 0.102724286 0.891262997 0.011304453 0.101348045 1.374654550 0.427215062
##  [247] 0.452690354 4.080845802 0.868338671 0.864849515 0.012452796 0.007514074
##  [253] 0.823607742 0.165356735 2.709573734 0.895703649 0.974593271 2.556080246
##  [259] 1.552874020 1.270480324 0.185249139 0.244638149 0.732194849 0.506580444
##  [265] 1.831371260 2.221819415 3.466652272 1.935631047 0.541288091 1.242341946
##  [271] 0.645734280 1.670359685 0.063566489 0.938906169 0.194714595 1.977245246
##  [277] 0.217456425 3.829209469 1.278845407 0.607230802 0.439715531 0.103359560
##  [283] 0.453373624 0.108902536 0.056416336 3.313009872 0.976395215 0.112437571
##  [289] 0.507395060 0.664907224 0.001128370 2.234083880 0.185314772 1.882646080
##  [295] 0.207528385 0.761920041 0.460517813 0.002004106 0.155351070 0.272951584
##  [301] 0.146382485 0.183752705 0.041920115 1.390971095 0.292997617 0.270271789
##  [307] 1.482573412 1.011805957 1.097518543 0.263606387 0.718805795 0.371964314
##  [313] 0.169317170 1.343345060 0.510628376 0.815411612 0.443537030 1.528347662
##  [319] 0.839097389 2.036985184 0.722331009 0.068034856 0.151244922 0.285954590
##  [325] 0.053769005 2.589369922 2.018583656 1.129711563 1.361319520 0.008685564
##  [331] 0.758263406 0.440145525 0.383896777 0.228700567 1.217232797 0.772299990
##  [337] 0.028746291 1.295824686 0.670453607 0.297849970 1.754023160 0.701078551
##  [343] 0.455371383 0.981718279 1.664081018 1.151805393 0.359244862 0.373818172
##  [349] 0.397108399 0.360767316 0.005181053 0.052341344 1.042995757 0.109432461
##  [355] 0.349139757 0.075378325 1.378377069 0.683608188 0.799400772 1.867689387
##  [361] 1.290712148 0.008847769 2.340139741 0.062896056 0.702032620 2.854472731
##  [367] 0.358040128 0.437438174 0.274368221 1.486204049 0.588295468 0.941244631
##  [373] 0.397547200 0.497870630 1.502992148 0.797491823 0.343271525 0.222755417
```

```
## [379] 1.378194721 0.980766284 1.205840305 1.732523064 1.806134485 1.087608239
## [385] 2.031135616 1.957223498 0.033219814 1.332963568 0.431612086 2.232900017
## [391] 0.290809405 2.656885070 1.110986385 0.408269480 1.023783569 0.206103201
## [397] 1.909352855 0.649679745 0.801814107 2.134518504 0.326324549 4.021122292
## [403] 0.388389126 1.031641747 1.560080413 0.982969072 1.346831912 1.347656880
## [409] 0.063908961 0.964495805 2.238740497 1.160951141 0.140354305 2.654948680
## [415] 0.392992025 0.272582572 0.211629258 0.313901145 0.114861311 1.194817351
## [421] 0.861483393 0.900802014 0.760009155 0.100111737 0.185090356 1.717457936
## [427] 0.556553037 0.675837446 0.019682661 0.457864007 0.472907651 2.269887918
## [433] 2.004364788 0.454453350 2.591199736 2.989013829 2.279893220 1.897070209
## [439] 0.679635341 0.426503314 0.843958340 0.065940055 1.339548234 0.772721344
## [445] 2.702596692 0.166593771 0.170662445 0.893999557 0.210483775 0.231422310
## [451] 0.335446535 1.179716921 0.148142807 0.171617827 2.243529215 1.109675096
## [457] 0.627960983 0.787798121 0.344533503 0.988751858 3.267823830 0.816306972
## [463] 0.854298582 0.104595374 0.067647915 1.725836243 0.450015394 0.657984208
## [469] 1.625141591 0.739352271 0.638901896 0.048682722 2.249822545 0.389732713
## [475] 0.454176351 2.024019501 0.923044998 0.066462902 0.943219001 0.086831821
## [481] 1.013999086 0.115733493 0.701726212 2.467560092 2.476701734 0.439200358
## [487] 0.303622531 1.709969374 0.021508223 0.888285502 1.233791792 0.085350861
## [493] 3.842204643 0.010780706 0.854519670 0.400585822 1.102070895 0.462182542
## [499] 0.269920795 0.539778550 0.252522673 0.540491600 0.953216661 1.046360474
## [505] 0.612461574 2.401017424 0.323283204 0.378154236 0.393900601 0.128518965
## [511] 0.824610824 2.014811308 1.285680110 0.226407155 3.517679181 0.664253911
## [517] 1.411225889 0.693142121 0.220013370 0.050613521 1.138975024 0.182183234
## [523] 0.986243253 2.403356533 0.046989567 0.115911820 0.508739711 0.087858850
## [529] 0.902077128 0.307111847 0.451880574 0.576001832 1.317409658 1.519719224
## [535] 0.588948362 0.512146468 0.544579749 1.489526049 2.062219601 0.991931818
## [541] 2.089249848 0.885437188 1.910878286 0.626759890 0.279126545 1.569142917
## [547] 0.229523415 3.940090634 1.770813443 1.428529843 1.786948471 0.033874057
```

```r
rgamma(df$Recovered,shape=1,scale=1)
```

```
##   [1] 0.2073259685 0.5015720469 0.1496717274 0.3306748393 0.0461078027
##   [6] 0.0726382866 0.2799250870 0.4994801243 0.8077857772 0.3971279900
##  [11] 0.2323057333 1.1932143143 1.2056177832 0.2729244269 1.0185580113
##  [16] 0.8945336023 0.8403833084 0.7283670146 0.8368439802 0.9590736285
##  [21] 0.0716885494 0.1848851954 0.2034858024 1.7314448851 2.0547146697
##  [26] 0.6539671401 1.1336500617 1.2576443266 0.5361507332 1.1012772367
##  [31] 1.2079486646 1.5066393307 0.1462736182 0.4388316555 0.0162740107
##  [36] 1.7487396719 0.0544823225 1.5312807531 0.3602970468 0.4242123852
##  [41] 0.9304066832 0.7257595640 0.7654244358 0.6174225119 0.0226050271
##  [46] 1.1780735223 1.5675226767 2.4134161900 1.8633099588 0.2204303941
##  [51] 1.1673749258 1.9224002139 0.2446677814 1.4058289823 0.0649718074
##  [56] 0.9280665657 0.3276053504 2.5758242360 0.4300320510 0.0448470992
##  [61] 0.0536369019 0.0956904910 0.1813294298 3.3020132965 1.6999581077
##  [66] 0.3488465689 0.2828528763 0.8545907121 2.1309130046 0.1086787459
##  [71] 0.2197563665 0.1039751539 0.5515445491 1.0147722233 1.1675098760
##  [76] 5.4865225530 0.2385926436 1.7549842688 2.5484961319 0.4015134259
##  [81] 1.5922224422 0.6844216925 0.2268441174 0.9135292840 0.0306047712
##  [86] 5.7137712925 1.3846614879 0.6145623785 4.2088914423 2.5744587177
##  [91] 0.3632903700 1.5650740604 0.2796085043 1.2654416530 1.2448203480
##  [96] 3.8836604608 0.7275611012 0.6079695650 1.1472065982 0.9214489030
## [101] 1.5646236301 0.4279518716 2.8731106511 0.1138839485 0.5904983701
## [106] 1.4693833324 0.2284690570 0.6312000894 0.1915268240 1.1670755290
## [111] 0.6624563394 1.7699627009 0.6362803413 0.2299327192 2.7829116705
```

```
## [116] 0.2765652796 3.9602463984 2.1077895307 0.2113781560 0.3680521154
## [121] 0.1584301063 1.0223561803 1.6574959641 0.2009772718 1.5019408089
## [126] 1.4745183568 0.3338872354 0.0307934164 0.1637411290 0.2281102760
## [131] 1.4354086487 0.1384665132 0.4826666339 0.7489473817 3.2070638841
## [136] 0.1811720063 1.7269866041 1.3815980506 0.9342776224 0.7789820899
## [141] 0.2629385378 1.7018614777 0.3184434069 0.7027242424 0.2720224172
## [146] 0.8714305608 0.5840651116 1.1158487489 0.0939653597 3.9111735621
## [151] 0.0569858965 0.3317013982 0.8791107281 0.5927140187 1.8096771259
## [156] 0.6095794145 0.9270904519 0.4504681902 0.6982246341 1.7443810815
## [161] 0.3786754066 1.1612377033 0.1106118216 0.0142784958 1.4755287834
## [166] 0.7841342526 0.3415496163 0.5503843935 0.9090354516 4.2939611423
## [171] 1.2559260124 0.2130230650 0.1298432895 0.3767349766 1.1790397687
## [176] 0.0842854060 0.9593159039 0.1567834456 0.9572774616 0.0695862344
## [181] 1.0165527515 0.2849953936 0.3585964687 1.3758448703 0.0097881918
## [186] 1.8006525655 1.8549213628 1.6553533208 0.2695303774 0.0067795429
## [191] 0.7875010718 2.7524286891 0.4400389961 0.9562671230 0.0155901784
## [196] 0.6105911955 0.0996092914 1.1224966772 0.1809830575 0.9369054815
## [201] 1.8027388521 0.1919969323 0.4181473208 0.4188119045 0.3671291531
## [206] 0.0001080867 1.8420533664 0.8297934860 2.0526893600 1.2049096857
## [211] 0.1333095398 0.0646820467 0.5959833508 1.8348893074 0.3648541617
## [216] 0.0624801336 0.3697484017 0.1616306656 0.7048262598 0.5376552600
## [221] 1.0573736555 2.7651397221 0.9740446332 0.9262883971 0.6729348702
## [226] 0.1912051305 1.3815049021 0.6268383163 0.6358492453 0.7930181767
## [231] 0.8441371677 0.1346910342 1.1255048096 1.2532636885 1.1221415081
## [236] 0.0339120181 3.8562948071 1.6880713177 2.9042883845 0.3018311641
## [241] 0.1473899318 0.9577610633 3.1733375745 2.2172759144 1.0533716605
## [246] 0.2082402692 0.3854597123 0.7698838786 3.5073881438 0.1434053262
## [251] 0.9901600458 0.4012461100 0.7740081785 1.4404727958 0.0115505500
## [256] 0.2874961961 1.3575371517 2.3576050909 0.0368817076 0.3320875645
## [261] 0.0730642728 0.5428192973 0.7139919620 0.3100547162 0.3327158525
## [266] 0.0460917012 2.7086730662 0.3633510920 0.3012412724 0.0583329714
## [271] 0.1974994726 1.3711599927 0.6687250627 0.1023297271 0.5684158347
## [276] 0.2585099550 0.0716173683 1.5470395938 0.1099222428 0.2721229459
## [281] 1.4644036980 1.1503816459 2.2095632363 2.8958287951 1.8309423203
## [286] 1.5186054363 0.0895045712 0.7610510732 1.9379659648 0.4309236549
## [291] 0.1534940773 0.3593130707 0.1561410209 0.3456456003 0.2638652329
## [296] 2.1963216059 0.4042076734 1.5199074186 1.1593310486 0.7032874977
## [301] 0.0186986176 1.3300049581 0.3249761933 1.6971162758 0.0515309030
## [306] 0.7825971812 1.2262951042 1.0261566268 1.8486396944 0.2645255035
## [311] 0.1940305749 0.2441857768 0.7073589772 0.6755911003 0.5438105584
## [316] 1.8282880406 0.3075074596 0.7138867300 1.5973858473 1.0430089020
## [321] 2.7881346729 0.4870510180 0.0970840571 0.1321708569 0.0713705658
## [326] 1.7274132188 2.4081240922 0.1559512162 0.9160623185 4.8382223036
## [331] 0.8081305202 0.9190576955 1.2325751252 2.1085395870 1.8408896227
## [336] 0.1700448156 1.4110273056 1.5801622259 2.2599846303 0.7198852149
## [341] 0.0519811557 0.5889070183 4.3589791203 2.4941427952 0.4948002007
## [346] 0.8070489140 0.1786625748 1.7639021222 0.6315837025 0.1796150934
## [351] 0.0868512076 0.2429074964 1.7941393077 0.0486443990 0.0012263299
## [356] 0.6400933067 1.9779250359 0.3264846634 0.3287113939 1.2723638803
## [361] 0.0241204079 0.0328696599 0.0378777542 0.5624048503 2.4305720627
## [366] 1.2798674859 0.5549873675 1.8635167320 0.0961906388 0.2793114211
## [371] 1.9595794441 1.1841760651 0.7511751358 0.7667181070 1.9580739453
## [376] 4.2645297293 2.7222992182 0.3398560967 0.1256201401 1.5982130472
## [381] 0.9037833913 0.4294874590 0.3029234735 1.6287000846 3.1460647654
```

```
## [386] 0.6360060455 0.6907896027 0.2618101314 0.4263629906 0.4428845564
## [391] 5.1376189840 0.1774608286 1.7291645148 0.4598786034 2.1595362372
## [396] 0.9253261550 1.1309661424 1.9486920002 0.4545230006 2.6686777751
## [401] 0.0494644815 0.0882327138 0.9348051506 0.1601995086 0.2904047961
## [406] 0.0383801964 2.5749441654 0.5894017860 0.0511691691 0.3948070051
## [411] 0.3869969462 0.9026719651 0.0801925621 1.1658181674 0.2401945938
## [416] 1.6166215788 0.1952391765 0.7037719612 3.1185180565 0.9827090987
## [421] 0.3659131921 0.9783219337 2.2677942020 0.6134711532 0.5641148714
## [426] 1.9390715395 1.2473913568 1.1196892584 0.6814252958 1.4045235534
## [431] 1.5352058208 0.0452079458 0.5299353830 0.1962844222 0.0304013792
## [436] 1.0191281733 1.1586510761 0.2396518612 0.0763791020 0.3438563326
## [441] 0.1308413195 2.0760140677 0.0312065641 0.0277723659 0.0098798657
## [446] 0.2866028673 0.1184152257 0.7015967715 1.5982975712 0.3868642284
## [451] 0.5664009757 2.2626849916 0.4662587406 0.7878924669 0.2893837019
## [456] 1.1403090247 0.3920887740 0.1060361875 2.9098757162 0.8122399374
## [461] 1.4635731565 1.1139923772 0.1185657550 1.0911524327 0.1090236583
## [466] 0.0099319468 1.3873148044 0.9289274471 0.1918137849 1.2537705327
## [471] 2.3477194156 0.1003044945 0.2820952672 2.4443389180 1.9833803635
## [476] 0.6232682904 1.8184745351 0.2072939001 1.1346289779 1.9554185258
## [481] 0.4152828446 1.9877139787 0.5924926276 0.7697817370 2.3939489216
## [486] 0.7881501265 0.1150133929 0.2418147774 0.0118193992 0.3504854464
## [491] 0.1574378040 0.4299152126 0.2335427610 4.2072880614 2.7525042210
## [496] 0.0733836928 2.1618453143 0.9645556505 2.3918158454 0.4000883928
## [501] 0.0436846650 0.0297134479 0.5806934720 0.4188576272 0.0016506413
## [506] 0.1988107358 0.5782114084 2.7215560436 0.3942436019 0.9251669244
## [511] 0.0123259483 1.8872872193 1.0640053899 0.6348258993 1.6056622305
## [516] 0.6039994895 0.2520360539 0.3703198181 0.0346958818 0.4547431961
## [521] 0.4511714377 0.7064608633 0.2582966432 0.7466476288 0.2057909594
## [526] 0.2333736948 1.4981184912 2.3638330373 1.3929023500 0.1209412292
## [531] 3.7365303153 0.1860905020 0.0573509065 0.3935184553 0.4557125757
## [536] 1.6782118293 0.1997316839 0.3368106064 0.7918503746 0.2228267335
## [541] 3.2152861867 1.5589721569 1.7526240680 0.4110636427 3.4278533744
## [546] 1.6621319587 1.3939914897 0.2625795144 1.4371849158 0.2759867362
## [551] 0.3552650521 0.7768539420
```

```
rgamma(df$Deceased,shape=1,scale=1)
```

```
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##    [6] 0.1220621244 0.2558606058 1.2073489920 0.1519900332 0.1433858656
##   [11] 0.4879476663 1.1418197306 1.9076321094 0.3078499563 0.4202964523
##   [16] 0.1275903038 1.4978059636 0.5776982854 0.4658830778 1.5669855437
##   [21] 0.1965856961 0.5244310305 2.2559454956 1.1214138634 1.0935671600
##   [26] 0.1521118778 0.2459629927 1.4506460259 0.4814059414 0.2165927234
##   [31] 1.4758301190 2.7705795210 0.6787961344 0.0068192840 3.0568719391
##   [36] 1.3285214583 0.3293959281 0.0002942522 1.5386836350 1.3178386282
##   [41] 1.2907067257 0.7883475173 1.5592529645 3.5188468663 0.0946781285
##   [46] 1.2855998089 0.5866429861 0.6223293993 1.8324945931 2.6577480288
##   [51] 0.2772332904 0.4276136296 0.2282605063 0.5225688211 0.3697447804
##   [56] 0.9972679709 0.5066334658 0.0250447891 0.1399992587 0.0120063551
##   [61] 0.7626369842 1.3845168391 2.3917895728 2.5470454698 1.4395143972
##   [66] 0.2777633304 3.5041416506 0.0003885460 1.0155217179 1.2304515035
##   [71] 0.0926550714 0.7436533404 1.8945481734 1.2995829337 0.1233160388
##   [76] 3.5651320895 0.2234972582 1.2369578020 0.5850337858 1.8562355470
##   [81] 0.3531748148 0.7878321391 0.7069766826 0.0121179249 2.4286280289
##   [86] 0.4593584627 0.1475187913 0.6766232699 0.4897570048 0.3089980583
```

```
##   [91] 2.1143784440 0.3176099969 1.4927553644 1.8923933211 0.0207041120
##   [96] 0.1831934308 0.4617449502 0.0674244037 0.3988033613 2.7686243077
##  [101] 0.7395290566 0.4174775593 0.3725921852 0.3815116845 0.7655670634
##  [106] 0.4389852761 0.1293423529 1.9082502458 0.4749680691 0.1019762001
##  [111] 1.0906421302 0.4769825560 1.2297846106 0.0518225817 2.1080062826
##  [116] 1.3084781532 1.5321976312 0.7434660212 0.1346427578 0.0146948477
##  [121] 1.1485091092 1.1193375998 0.1119182597 0.5402228246 1.0065366299
##  [126] 1.4805249052 1.0592833501 1.0779280230 0.9211601755 0.5663004544
##  [131] 1.9334562722 0.2630213687 0.0512686734 0.9049201957 0.7906038527
##  [136] 1.0187456426 0.0791540714 3.4047444165 0.3190013544 0.7199932763
##  [141] 1.1332679399 1.4861406638 1.8245292900 0.2045269621 1.1361922079
##  [146] 1.2747168768 0.5910820461 1.2559848853 1.4601059698 1.5153098166
##  [151] 0.0858082439 0.1300841945 0.6293868898 2.4680612574 0.0690532625
##  [156] 3.0232197441 0.3486120812 0.8798436525 0.0545917614 1.2597318697
##  [161] 0.2429010596 0.4327688899 0.0037085342 0.1275045976 1.8582977671
##  [166] 0.9531030507 0.0193079315 0.7107640120 1.6779811726 2.7236532903
##  [171] 0.4306919802 0.1663999431 0.9054991697 2.7747726600 0.1137280370
##  [176] 1.9832882703 0.0009137508 0.5810068870 1.3002014134 2.4131202064
##  [181] 0.4499529401 0.1403271034 0.5890971635 0.0296931315 0.0741774619
##  [186] 1.1661777956 0.7809272292 0.3466238314 1.8049345359 1.2063281697
##  [191] 1.9263651640 0.1541743697 0.1826717326 0.6037546547 0.8915731075
##  [196] 0.2419128753 0.9368971609 0.2919493111 0.5836575133 0.1819732810
##  [201] 0.3199493833 0.2130039661 0.9808269052 1.0037361700 0.3687363281
##  [206] 2.1444102501 0.2730002012 0.1780347530 1.5346836226 0.4016561826
##  [211] 1.3931537728 0.9003831124 0.7759401304 0.6709980357 0.2187299463
##  [216] 1.8096059065 0.0936400294 5.3930763165 2.5343034770 0.2904778906
##  [221] 0.6548410118 0.3721093471 0.6519500456 1.7250173172 0.4509149930
##  [226] 1.8242129974 0.2178937360 2.8425981731 0.3375237921 1.2988530050
##  [231] 0.8982332635 0.2732762222 0.5898699539 1.2181725599 0.0484321269
##  [236] 0.2699546193 0.1678500930 0.0444641621 0.4115262428 0.2284174504
##  [241] 0.1554730415 0.2379312594 0.4040459297 1.1281850817 1.1558308612
##  [246] 0.7429168688 0.2051578197 0.4584400452 1.7569879862 0.3047534436
##  [251] 0.3053595685 0.6830125837 0.1228648663 0.2808376573 0.3678773311
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##  [261] 1.7671734611 0.7284515018 0.0900763625 0.3749627553 0.6359772265
##  [266] 0.7057955680 0.5149231805 1.5871540140 1.0568361989 0.0256373177
##  [271] 0.4285092911 0.0317607368 1.4541808930 3.8480717209 1.3430085064
##  [276] 0.9274975987 2.4109760721 0.2832412463 0.3534916897 0.6668723669
##  [281] 0.5205045965 0.3966252597 0.8802501014 1.3228509284 0.0544494851
##  [286] 1.4225076124 1.0064378858 0.4769816271 0.0651840971 0.0660958748
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##  [296] 0.8164820851 2.6578840118 0.3258788132 0.1090884667 0.0954006801
##  [301] 1.2147152521 1.6827466645 0.4105926743 2.9096071190 0.2323986799
##  [306] 0.1234935873 0.0913316404 0.4276648044 0.4551439639 0.1846187309
##  [311] 0.7012741321 0.1019773278 4.1891395461 2.9530320503 0.5813232031
##  [316] 2.3960439846 0.1119441787 0.2010622584 1.1260889123 2.4382200933
##  [321] 0.0708031125 1.4874734311 4.1206559082 0.1060369760 0.5440252477
##  [326] 1.3972850909 0.3011932600 0.3648458867 0.5963569597 1.2717020592
##  [331] 0.7601262497 0.6018560417 0.0033424363 0.6353559711 0.1303139944
##  [336] 3.1305487139 2.3027884669 0.3656593785 0.7940231727 0.5941432471
##  [341] 0.5248672059 0.9253107574 0.4853029714 3.9133525976 0.2514341889
##  [346] 0.5160138390 0.7686058170 0.0407316857 0.6020498943 0.2099150548
##  [351] 0.1578759908 1.2195064024 1.2320942405 0.7586508223 1.5865894598
##  [356] 0.8906267515 1.0400298795 1.4199788053 1.2251524239 0.0009822177
```

```
## [361] 1.3461336491 4.2343375929 0.2292331232 0.2786235761 1.0724391518
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## [371] 2.3281743812 0.3650725686 0.6753147174 1.5051801559 0.1620546938
## [376] 0.2924259276 0.1443815592 2.1290315172 2.4030935761 0.3347705911
## [381] 2.8366681786 1.8694119977 1.8729259672 0.0256968465 0.0327157265
## [386] 0.8619340613 2.4781035598 0.6144481623 0.3316445724 0.2450523051
## [391] 0.8220984160 0.9471726008 1.5843420658 0.3297386196 0.0004491124
## [396] 0.3432385764 1.5699348572 0.8882660555 0.5070199729 1.0756826967
## [401] 1.6096637474 0.8871424718 0.6271137075 1.2802329049 5.0192289762
## [406] 0.2669616443 0.2648578222 0.3203751132 1.1900942989 0.1221757463
## [411] 1.0128480049 0.2265168190 3.0185792946 1.1761904677 0.2021650212
## [416] 1.0761544165 0.1020970274 0.8393001489 0.6769147820 0.6356335594
## [421] 0.0041391624 3.1380780099 1.0829572054 0.9910701958 0.7803418336
## [426] 0.7160388061 1.2037805464 2.1404763936 3.3910259365 0.5862278274
## [431] 1.1346875722 0.8472272187 0.3852943257 0.4271800242 0.2914340047
## [436] 0.3228278378 0.6449201762 0.1400785120 1.1231699873 2.6840350270
## [441] 0.1975278723 0.2065514963 0.1740559305 0.4868841256 0.2584376741
## [446] 0.2399017973 0.5122004452 0.9324675427 0.0282091377 0.8888905699
## [451] 0.0724091673 0.1605719831 0.0231758277 2.1947949769 0.8396596719
## [456] 0.4572074304 0.1623914686 0.2241792006 0.9787229491 2.0757905339
## [461] 1.4255078812 0.1841489951 0.7718411118 3.8533126152 0.2541098115
## [466] 0.7223387120 1.9535213224 0.0645670300 1.4391019227 0.1136337412
## [471] 0.2230511974 0.3280242331 2.3542238468 2.0717459101 0.7207735738
## [476] 0.5702423961 0.2174569074 1.7695359989 0.1382109765 0.1375731306
## [481] 0.3566120827 0.9360200913 1.0235008186 0.4856907985 0.3410753095
## [486] 1.4301813116 0.1065136091 0.4248388356 0.4960130035 1.3887168081
## [491] 0.2496887873 0.2806595461 0.1789801270 2.7282828676 0.2848082955
## [496] 1.5642219593 1.4942693192 0.8935160203 1.2024646978 1.1837348256
## [501] 0.9425088079 0.3749471430 1.5909268649 0.9360106951 1.1657652147
## [506] 2.0337974996 0.1539851274 0.4495760342 1.6448300280 0.1804134221
## [511] 0.1194189177 0.1439574145 1.1755584378 0.5463209876 0.1007039504
## [516] 0.6400895487 0.7182650596 0.7623795030 0.5843806750 2.9212669358
## [521] 4.6284058236 2.2594973051 3.4839317108 1.3596297472 0.3549260125
## [526] 2.4445453302 0.1024691114 0.4250268798 0.6037485340 0.3465662495
## [531] 0.0077174417 0.5444982131 0.3841514840 0.8611464476 0.1740153919
## [536] 0.1494555832 1.5703348406 0.1719516267 0.4104901648 0.0449562657
## [541] 1.7023226632 0.0475439208 2.0270268233 0.7094879436 1.0554752307
## [546] 0.4083527221 0.7475524235 0.0461536572 0.4172035792 0.9219612954
## [551] 0.4728617633 1.3754140928
```

```r
dpois(df$Confirmed, lambda=1, log = FALSE)
```

```
##    [1] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##    [6] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##   [11] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##   [16] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##   [21] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##   [26] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##   [31] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##   [36] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 5.109437e-04
##   [41] 9.123994e-06 3.678794e-01 1.839397e-01 6.131324e-02 3.678794e-01
##   [46] 1.839397e-01 6.131324e-02 3.678794e-01 3.678794e-01 3.678794e-01
##   [51] 7.680130e-10 7.680130e-10 2.813234e-13 1.206604e-30 4.219851e-12
##   [56] 1.013777e-06 3.024203e-18 1.803518e-47 5.109437e-04 1.512101e-19
##   [61] 1.398086e-36 7.299195e-05 5.929251e-25 7.200483e-21 1.013777e-06
```

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```
##  [66] 9.216156e-09 9.123994e-06 5.907792e-11 9.123994e-06 1.013777e-06
##  [71] 7.680130e-10 7.299195e-05 1.013777e-07 1.839397e-01 6.131324e-02
##  [76] 9.123994e-06 3.678794e-01 7.299195e-05 3.678794e-01 1.532831e-02
##  [81] 1.839397e-01 5.109437e-04 3.024203e-18 9.216156e-09 1.013777e-07
##  [86] 6.131324e-02 7.299195e-05 9.216156e-09 5.907792e-11 1.532831e-02
##  [91] 1.013777e-07 1.839397e-01 3.678794e-01 1.839397e-01 3.678794e-01
##  [96] 3.678794e-01 6.131324e-02 3.678794e-01 3.678794e-01 3.678794e-01
## [101] 1.839397e-01 7.299195e-05 7.299195e-05 3.065662e-03 1.013777e-07
## [106] 9.121925e-28 1.758271e-14 9.216156e-09 4.219851e-12 4.160703e-32
## [111] 7.680130e-10 5.929251e-25 5.929251e-25 2.618348e-52 1.168986e-86
## [116] 8.605602e-71 6.047845e-64 1.008687e-95 4.508795e-49 1.305878e-129
## [121] 1.168986e-86 1.565071e-79 7.247710e-85 9.077409e-78 1.518463e-131
## [126] 7.738894e-124 3.383216e-147 2.086723e-181 2.777199e-175 2.999375e-173
## [131] 2.720999e-141 2.720999e-141 4.460415e-92 9.323969e-126 3.248590e-116
## [136] 1.305878e-129 1.593630e-72 7.738894e-124 4.112139e-118 1.482838e-110
## [141] 3.824398e-153 7.853077e-196 1.221112e-214 2.473520e-227 5.317878e-238
## [146] 1.938101e-244 2.805379e-268 3.028736e-206 6.438906e-264 0.000000e+00
## [151] 7.853077e-196 3.725345e-204 4.342512e-223 4.264176e-266 7.802778e-286
## [156] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [161] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [166] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [171] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [176] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [181] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [186] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [191] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [196] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [201] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [206] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [211] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [216] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [221] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [226] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [231] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [236] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [241] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [246] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [251] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [256] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [261] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [266] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [271] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [276] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [281] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [286] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [291] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [296] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [301] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [306] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [311] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [316] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [321] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [326] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [331] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
```

```
## [336]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [411]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [416]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [421]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [426]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [431]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [436]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```r
dpois(df$Recovered, lambda=1, log = FALSE)
```

```
## [1]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [6]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [11]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [16]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [21]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [26]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [31]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [36]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
```

```
##  [41] 3.678794e-01  3.678794e-01  3.678794e-01  3.678794e-01  3.678794e-01
##  [46] 3.678794e-01  3.678794e-01  3.678794e-01  3.678794e-01  3.678794e-01
##  [51] 3.678794e-01  3.678794e-01  3.678794e-01  3.678794e-01  3.678794e-01
##  [56] 3.678794e-01  3.678794e-01  6.131324e-02  9.123994e-06  1.532831e-02
##  [61] 3.678794e-01  1.532831e-02  1.839397e-01  1.839397e-01  4.219851e-12
##  [66] 9.123994e-06  5.109437e-04  6.131324e-02  7.680130e-10  5.907792e-11
##  [71] 5.907792e-11  3.378491e-29  3.024203e-18  9.889410e-43  3.024203e-18
##  [76] 5.907792e-11  7.299195e-05  3.378491e-29  1.013777e-07  1.839397e-01
##  [81] 5.907792e-11  7.200483e-21  1.758271e-14  3.678794e-01  9.123994e-06
##  [86] 2.813234e-13  7.299195e-05  1.532831e-02  5.907792e-11  1.532831e-02
##  [91] 1.013777e-07  4.219851e-12  1.013777e-06  9.123994e-06  3.678794e-01
##  [96] 7.247710e-85  3.678794e-01  7.299195e-05  3.065662e-03  1.013777e-07
## [101] 3.678794e-01  1.532831e-02  3.678794e-01  3.678794e-01  3.678794e-01
## [106] 6.131324e-02  3.678794e-01  1.532831e-02  3.678794e-01  3.678794e-01
## [111] 3.678794e-01  3.065662e-03  9.123994e-06  1.839397e-01  6.131324e-02
## [116] 3.065662e-03  7.680130e-10  1.013777e-07  1.013777e-07  6.131324e-02
## [121] 1.013777e-07  1.013777e-07  2.813234e-13  5.745985e-17  3.024203e-18
## [126] 5.929251e-25  1.803518e-47  3.272947e-22  1.209569e-65  1.099706e-50
## [131] 9.216156e-09  1.246066e-39  9.077409e-78  1.168986e-86  1.398086e-36
## [136] 6.685530e-59  5.174123e-76 8.229753e-107  4.421103e-83 2.476109e-139
## [141] 2.228498e-137 3.709666e-151  9.077409e-78 3.180223e-145 1.983363e-135
## [146] 4.421103e-83 6.345893e-122  8.605602e-71  4.460415e-92 3.826311e-163
## [151] 2.618348e-52 4.112139e-118 1.482838e-110 3.289782e-225  0.000000e+00
## [156] 0.000000e+00  0.000000e+00 1.550812e-212 2.446631e-301 1.648802e-185
## [161] 3.401891e-169 9.658359e-262 1.863146e-183 9.544475e-249 3.289782e-225
## [166] 2.991633e-290  0.000000e+00  0.000000e+00  0.000000e+00 2.473520e-227
## [171] 0.000000e+00 1.723451e-312  0.000000e+00  0.000000e+00  0.000000e+00
## [176] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [181] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [186] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [191] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [196] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [201] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [206] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [211] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [216] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [221] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [226] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [231] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306] 0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [311]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [316]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [321]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [326]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [331]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [336]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [411]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [416]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [421]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [426]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [431]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [436]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```r
dpois(df$Deceased, lambda=1, log = FALSE)
```

```
##  [1]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
##  [6]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
## [11]   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01   3.678794e-01
```

```
##  [16] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [21] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [26] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [31] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [36] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [41] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [46] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [51] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [56] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [61] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [66] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [71] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [76] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [81] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [86] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [91] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
##  [96] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [101] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [106] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [111] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [116] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [121] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [126] 3.678794e-01 6.131324e-02 3.678794e-01 3.678794e-01 3.678794e-01
## [131] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [136] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [141] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [146] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [151] 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [156] 3.678794e-01 3.678794e-01 3.678794e-01 1.839397e-01 3.678794e-01
## [161] 3.678794e-01 3.678794e-01 3.678794e-01 1.839397e-01 1.839397e-01
## [166] 1.839397e-01 3.678794e-01 3.678794e-01 1.839397e-01 3.678794e-01
## [171] 1.839397e-01 1.839397e-01 3.678794e-01 3.678794e-01 3.678794e-01
## [176] 3.065662e-03 1.532831e-02 3.065662e-03 1.839397e-01 1.839397e-01
## [181] 1.532831e-02 3.678794e-01 1.839397e-01 6.131324e-02 9.123994e-06
## [186] 3.678794e-01 1.839397e-01 6.131324e-02 7.299195e-05 6.131324e-02
## [191] 3.065662e-03 1.532831e-02 1.839397e-01 7.299195e-05 3.065662e-03
## [196] 5.109437e-04 6.131324e-02 1.013777e-07 7.299195e-05 1.013777e-07
## [201] 5.907792e-11 5.109437e-04 7.299195e-05 1.013777e-06 7.680130e-10
## [206] 2.813234e-13 3.065662e-03 9.216156e-09 1.013777e-07 5.907792e-11
## [211] 1.013777e-07 7.299195e-05 5.109437e-04 7.299195e-05 7.299195e-05
## [216] 1.532831e-02 7.299195e-05 1.013777e-07 9.216156e-09 9.216156e-09
## [221] 1.013777e-07 7.680130e-10 5.907792e-11 7.680130e-10 7.680130e-10
## [226] 4.219851e-12 2.813234e-13 4.219851e-12 2.813234e-13 7.680130e-10
## [231] 4.219851e-12 1.013777e-06 7.680130e-10 5.745985e-17 1.758271e-14
## [236] 5.745985e-17 3.024203e-18 1.512101e-19 7.200483e-21 3.272947e-22
## [241] 7.200483e-21 7.200483e-21 1.512101e-19 3.272947e-22 1.423020e-23
## [246] 4.160703e-32 1.512101e-19 3.272947e-22 1.423020e-23 1.423020e-23
## [251] 2.371700e-26 3.272947e-22 5.929251e-25 2.371700e-26 1.423020e-23
## [256] 2.371700e-26 3.272947e-22 7.200483e-21 1.512101e-19 1.423020e-23
## [261] 5.929251e-25 9.121925e-28 3.272947e-22 7.200483e-21 5.929251e-25
## [266] 9.121925e-28 1.423020e-23 9.121925e-28 2.371700e-26 9.121925e-28
## [271] 1.512101e-19 5.929251e-25 3.378491e-29 9.121925e-28 1.206604e-30
## [276] 3.378491e-29 1.206604e-30 7.200483e-21 9.121925e-28 1.206604e-30
## [281] 9.121925e-28 3.378491e-29 1.206604e-30 5.929251e-25 3.272947e-22
```

```
## [286]  1.206604e-30  4.160703e-32  2.371700e-26  9.121925e-28  9.121925e-28
## [291]  7.200483e-21  3.024203e-18  3.378491e-29  1.206604e-30  9.121925e-28
## [296]  1.206604e-30  2.371700e-26  3.378491e-29  3.272947e-22  5.929251e-25
## [301]  9.121925e-28  3.378491e-29  1.423020e-23  2.371700e-26  3.378491e-29
## [306]  7.200483e-21  9.121925e-28  1.206604e-30  4.473874e-35  4.160703e-32
## [311]  1.398086e-36  1.206604e-30  1.423020e-23  4.473874e-35  3.560187e-41
## [316]  9.121925e-28  4.160703e-32  1.398086e-36  4.160703e-32  5.929251e-25
## [321]  4.236623e-38  3.378491e-29  3.378491e-29  1.423020e-23  4.160703e-32
## [326]  1.386901e-33  3.378491e-29  3.378491e-29  3.272947e-22  3.272947e-22
## [331]  1.758271e-14  7.200483e-21  2.371700e-26  4.219851e-12  5.929251e-25
## [336]  1.206604e-30  1.386901e-33  1.423020e-23  7.200483e-21  2.371700e-26
## [341]  3.024203e-18  5.929251e-25  2.371700e-26  2.371700e-26  1.423020e-23
## [346]  3.272947e-22  1.423020e-23  1.512101e-19  2.371700e-26  9.121925e-28
## [351]  3.024203e-18  1.423020e-23  3.378491e-29  7.200483e-21  1.034277e-15
## [356]  9.121925e-28  5.745985e-17  7.200483e-21  3.024203e-18  1.423020e-23
## [361]  1.512101e-19  1.034277e-15  3.024203e-18  1.512101e-19  3.024203e-18
## [366]  3.272947e-22  5.745985e-17  7.200483e-21  1.034277e-15  1.758271e-14
## [371]  1.512101e-19  1.034277e-15  3.024203e-18  1.758271e-14  3.024203e-18
## [376]  1.758271e-14  3.024203e-18  5.745985e-17  1.758271e-14  5.745985e-17
## [381]  1.758271e-14  2.813234e-13  5.907792e-11  5.745985e-17  1.758271e-14
## [386]  4.219851e-12  2.813234e-13  5.907792e-11  2.813234e-13  1.758271e-14
## [391]  4.219851e-12  1.034277e-15  4.219851e-12  4.219851e-12  5.745985e-17
## [396]  2.813234e-13  5.907792e-11  1.758271e-14  2.813234e-13  4.219851e-12
## [401]  1.758271e-14  1.758271e-14  5.907792e-11  7.680130e-10  1.758271e-14
## [406]  4.219851e-12  5.907792e-11  4.219851e-12  7.680130e-10  2.813234e-13
## [411]  9.216156e-09  2.813234e-13  5.907792e-11  2.813234e-13  1.034277e-15
## [416]  2.813234e-13  5.907792e-11  7.680130e-10  1.013777e-07  1.013777e-07
## [421]  7.680130e-10  4.219851e-12  4.219851e-12  7.680130e-10  9.216156e-09
## [426]  1.758271e-14  2.813234e-13  9.216156e-09  4.219851e-12  7.680130e-10
## [431]  1.013777e-07  7.680130e-10  4.219851e-12  1.758271e-14  5.745985e-17
## [436]  3.272947e-22  1.034277e-15  1.758271e-14  9.216156e-09  1.512101e-19
## [441]  3.272947e-22  1.512101e-19  7.200483e-21  3.378491e-29  2.371700e-26
## [446]  7.200483e-21  1.206604e-30  3.272947e-22  1.206604e-30  3.378491e-29
## [451]  2.371700e-26  1.386901e-33  1.206604e-30  1.398086e-36  1.099706e-50
## [456]  2.963444e-62  6.047845e-64  2.963444e-62  6.047845e-64  3.075344e-57
## [461]  9.077409e-78  1.565071e-79  1.855533e-88  1.593630e-72  2.899270e-90
## [466]  1.483364e-97  4.460415e-92 4.112139e-118 3.561280e-149 3.824398e-153
## [471] 3.180223e-145 3.709666e-151 2.228498e-137 1.745360e-133 3.824398e-153
## [476] 1.863146e-183 9.539935e-217 1.364860e-246 1.857687e-321  0.000000e+00
## [481]  0.000000e+00 9.881313e-324 4.264176e-266  0.000000e+00  0.000000e+00
## [486]  0.000000e+00  0.000000e+00 5.725371e-317  0.000000e+00  0.000000e+00
## [491] 1.833581e-270 1.367341e-231  0.000000e+00  0.000000e+00  0.000000e+00
## [496] 2.442529e-208 4.924058e-277  0.000000e+00 9.962145e-315 2.964336e-310
## [501]  0.000000e+00 4.846446e-288 4.085873e-299 2.129861e-257 1.983363e-135
## [506] 2.476109e-139 1.257667e-189 1.863146e-183 3.383216e-147 1.938101e-244
## [511] 6.438906e-264 1.005398e-233 7.853077e-196 7.853077e-196  1.168986e-86
## [516] 2.316263e-179 3.571986e-167 1.364860e-246 2.442529e-208 3.130896e-255
## [521] 1.367341e-231 1.951103e-112 3.826311e-163 1.364860e-246 1.439096e-259
## [526] 1.364860e-246 5.688691e-221 2.547889e-177 3.824398e-153 3.941866e-159
## [531] 2.442529e-208 9.539935e-217 1.745360e-133 5.688691e-221 1.446317e-187
## [536] 6.345893e-122  1.565071e-79 3.571986e-167 3.401891e-169 3.725345e-204
## [541] 3.289782e-225 3.902447e-155  6.758204e-94 1.367341e-231 4.924058e-277
## [546] 4.342512e-223 9.539935e-217 1.084196e-191 5.140174e-120  5.174123e-76
## [551] 7.853077e-196 1.439096e-259
```

```
ppois(df$Confirmed, lambda=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.3678794 0.3678794 0.3678794 0.7357589 0.7357589 0.3678794 0.3678794
##   [8] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [15] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [22] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [29] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [36] 0.3678794 0.3678794 0.3678794 0.3678794 0.9999168 0.9999989 0.3678794
##  [43] 0.9196986 0.9810118 0.3678794 0.9196986 0.9810118 0.3678794 0.3678794
##  [50] 0.7357589 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999
##  [57] 1.0000000 1.0000000 0.9999168 1.0000000 1.0000000 0.9999898 1.0000000
##  [64] 1.0000000 0.9999999 1.0000000 0.9999989 1.0000000 0.9999989 0.9999999
##  [71] 1.0000000 0.9999898 1.0000000 0.9196986 0.9810118 0.9999989 0.7357589
##  [78] 0.9999898 0.7357589 0.9963402 0.9196986 0.9999168 1.0000000 1.0000000
##  [85] 1.0000000 0.9810118 0.9999898 1.0000000 1.0000000 0.9963402 1.0000000
##  [92] 0.9196986 0.3678794 0.9196986 0.3678794 0.3678794 0.9810118 0.3678794
##  [99] 0.3678794 0.7357589 0.9196986 0.9999898 0.9999898 0.9994058 1.0000000
## [106] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
ppois(df$Recovered, lambda=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##   [8] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [15] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [22] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [29] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [36] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [43] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [50] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [57] 0.3678794 0.9810118 0.9999989 0.9963402 0.3678794 0.9963402 0.9196986
##  [64] 0.9196986 1.0000000 0.9999989 0.9999168 0.9810118 1.0000000 1.0000000
##  [71] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999898
##  [78] 1.0000000 1.0000000 0.9196986 1.0000000 1.0000000 1.0000000 0.7357589
##  [85] 0.9999989 1.0000000 0.9999898 0.9963402 1.0000000 0.9963402 1.0000000
##  [92] 1.0000000 0.9999999 0.9999989 0.7357589 1.0000000 0.3678794 0.9999898
##  [99] 0.9994058 1.0000000 0.7357589 0.9963402 0.3678794 0.3678794 0.7357589
## [106] 0.9810118 0.3678794 0.9963402 0.3678794 0.3678794 0.3678794 0.9994058
## [113] 0.9999989 0.9196986 0.9810118 0.9994058 1.0000000 1.0000000 1.0000000
## [120] 0.9810118 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
ppois(df$Deceased, lambda=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##   [8] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [15] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [22] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [29] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [36] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [43] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [50] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [57] 0.3678794 0.3678794 0.7357589 0.3678794 0.3678794 0.7357589 0.3678794
##  [64] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [71] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [78] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [85] 0.3678794 0.7357589 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [92] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
##  [99] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
## [106] 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794 0.3678794
## [113] 0.3678794 0.7357589 0.3678794 0.7357589 0.7357589 0.3678794 0.3678794
## [120] 0.7357589 0.7357589 0.7357589 0.7357589 0.3678794 0.7357589 0.3678794
## [127] 0.9810118 0.3678794 0.7357589 0.3678794 0.7357589 0.3678794 0.7357589
## [134] 0.7357589 0.7357589 0.3678794 0.3678794 0.7357589 0.3678794 0.3678794
## [141] 0.7357589 0.3678794 0.3678794 0.3678794 0.3678794 0.7357589 0.3678794
## [148] 0.3678794 0.3678794 0.3678794 0.3678794 0.7357589 0.7357589 0.7357589
## [155] 0.3678794 0.3678794 0.3678794 0.3678794 0.9196986 0.3678794 0.3678794
## [162] 0.3678794 0.3678794 0.9196986 0.9196986 0.9196986 0.7357589 0.7357589
## [169] 0.9196986 0.7357589 0.9196986 0.9196986 0.7357589 0.7357589 0.7357589
## [176] 0.9994058 0.9963402 0.9994058 0.9196986 0.9196986 0.9963402 0.7357589
## [183] 0.9196986 0.9810118 0.9999989 0.7357589 0.9196986 0.9810118 0.9999898
## [190] 0.9810118 0.9994058 0.9963402 0.9196986 0.9999898 0.9994058 0.9999168
## [197] 0.9810118 1.0000000 0.9999898 1.0000000 1.0000000 0.9999168 0.9999898
## [204] 0.9999999 1.0000000 1.0000000 0.9994058 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 0.9999898 0.9999168 0.9999898 0.9999898 0.9963402 0.9999898
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 0.9999999 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
qpois(df$Recovered, lambda=1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qpois(df$Recovered, lambda = 1, lower.tail = TRUE, log.p = FALSE):
## NaNs produced
```

```
##   [1]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [55]   0   0   0 NaN NaN NaN   0 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN Inf NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN NaN NaN Inf NaN   0 NaN NaN NaN Inf NaN   0   0 Inf NaN   0 NaN
## [109]   0   0   0 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

`rpois(df$Confirmed, lambda=1)`

```
##   [1] 0 1 1 0 2 1 1 1 0 0 1 2 1 2 0 0 1 0 0 1 1 0 0 1 3 1 1 1 2 2 0 0 0 0 2 1 0
##  [38] 1 0 0 1 3 2 1 0 0 0 1 0 2 3 2 0 3 0 0 3 1 2 1 1 2 2 0 0 3 1 0 0 2 1 0 1 0
##  [75] 1 2 1 1 4 0 1 0 0 2 0 1 2 1 1 1 2 2 0 2 0 0 2 1 0 0 2 2 1 2 0 0 2 0 0 1 1
## [112] 0 0 0 0 2 1 1 0 2 4 1 4 0 2 0 2 1 0 2 2 0 0 0 1 1 0 1 0 3 1 1 0 1 0 1 2 2
## [149] 1 0 2 1 0 0 1 2 3 0 2 0 2 0 1 2 2 1 3 1 0 1 3 2 0 0 2 0 1 0 2 3 1 1 0 1 1
## [186] 0 3 1 0 2 4 0 0 1 1 2 1 1 3 2 3 2 0 1 0 2 1 2 2 0 0 1 1 1 0 0 1 1 1 2 1 3
## [223] 2 1 2 1 1 1 0 1 2 0 1 0 1 1 0 0 2 1 0 0 0 2 1 2 0 0 2 1 1 3 1 1 0 1 0 1 0
## [260] 4 1 0 1 1 0 2 3 1 0 1 1 1 1 0 0 0 0 2 1 0 0 1 1 0 0 1 0 1 1 1 2 3 2 0 2 2
## [297] 1 1 1 0 0 1 1 2 0 2 2 1 1 0 1 0 2 1 1 1 2 1 0 0 2 0 0 2 1 1 1 1 2 1 1 0 2
## [334] 1 0 1 0 2 3 1 2 1 0 1 0 1 0 1 0 0 1 1 0 1 5 0 1 1 0 2 2 1 0 0 2 0 0 0 0 1
## [371] 1 2 1 1 4 1 2 1 3 1 1 3 2 0 0 1 2 1 2 0 1 2 2 1 0 1 1 1 2 2 1 1 1 1 3 0 2
## [408] 0 1 3 1 0 0 3 3 2 1 1 0 0 1 2 1 1 0 1 1 2 0 1 0 1 2 0 1 0 0 2 0 0 1 0 0 1
## [445] 2 2 0 0 0 2 0 0 0 1 2 0 1 0 1 2 0 1 2 2 0 1 0 0 3 0 0 0 1 2 0 0 1 1 0 1 2
## [482] 1 0 3 0 2 0 2 2 3 0 1 1 1 1 2 2 0 0 1 1 1 1 2 0 1 3 1 1 2 1 3 0 2 0 1 1 0
## [519] 0 0 1 0 2 1 1 1 1 0 0 2 1 1 1 2 0 2 1 0 2 1 0 0 3 1 2 1 0 2 0 2 1 0
```

`rpois(df$Recovered,lambda=1)`

```
##   [1] 1 2 2 0 2 0 1 0 0 2 1 0 1 3 0 0 1 2 1 0 3 2 0 0 1 0 0 0 1 1 1 3 1 0 5 1 0
##  [38] 1 1 3 1 0 1 1 0 2 0 1 0 2 0 2 1 1 2 1 1 0 1 1 2 1 0 1 0 0 3 0 2 2 4 1 1 1
##  [75] 1 2 0 1 0 1 1 2 3 0 1 3 1 0 1 2 4 1 3 0 3 1 0 0 0 0 0 1 0 0 2 0 0 1 1 3 2
## [112] 1 1 0 1 1 1 2 1 2 1 3 1 1 0 1 2 2 0 0 2 0 0 1 0 0 0 1 1 0 2 1 1 1 0 0 0 1
## [149] 1 1 3 4 1 1 1 1 1 0 0 1 1 0 0 3 2 1 0 0 3 0 0 0 1 0 0 0 0 0 1 2 1 0 0 1 2
## [186] 3 0 1 3 0 0 2 2 2 1 1 0 1 3 1 0 2 0 0 3 0 3 1 0 1 1 1 2 1 0 3 1 2 2 1 1 0
## [223] 3 1 1 0 1 0 1 0 1 0 3 2 0 0 2 0 2 1 3 1 2 0 1 1 1 1 0 0 0 3 1 0 1 0 0 0 0
## [260] 1 0 0 1 0 1 3 0 1 0 0 0 0 2 0 0 1 1 1 2 0 2 1 2 0 0 1 2 3 1 0 2 1 1 2 0 1
## [297] 0 2 1 1 1 3 0 0 1 1 1 1 0 0 0 1 1 2 0 3 0 1 2 1 3 0 0 1 0 0 0 2 0 1 0 0 0
## [334] 0 0 2 1 1 2 1 2 1 2 1 0 1 2 1 0 2 0 2 0 1 2 1 1 0 0 1 1 2 0 1 1 0 1 2 0 0
## [371] 1 3 1 2 2 1 2 1 1 2 1 1 1 1 0 0 0 1 2 3 2 0 1 2 0 1 1 1 0 0 0 0 1 2 0 0 1
## [408] 1 0 0 1 0 2 0 0 2 0 1 2 0 1 0 2 3 0 0 1 2 1 0 1 0 1 4 2 1 1 0 0 0 0 0 0 1
## [445] 2 1 3 1 0 0 2 0 2 0 2 1 1 1 1 3 1 2 0 0 0 0 0 3 2 0 4 0 1 1 2 1 1 0 0 2 1
## [482] 1 2 0 1 1 1 0 0 0 0 1 2 1 3 1 0 1 0 2 0 1 0 0 0 0 0 1 0 1 1 1 0 0 1 1 2 0
## [519] 0 0 0 0 2 0 1 0 1 0 2 1 1 3 1 1 1 1 0 1 2 1 2 2 0 2 1 1 0 1 1 1 0 2
```

`rpois(df$Deceased,lambda=1)`

```
##   [1] 0 2 1 2 0 0 0 2 0 1 0 1 0 1 3 0 0 1 1 0 2 1 1 1 0 4 0 2 3 0 0 0 3 1 0 2 1
##  [38] 3 0 1 0 1 1 0 1 1 1 1 0 2 3 0 2 3 1 0 2 1 1 2 2 1 1 2 0 4 0 1 1 1 0 0 1 2
##  [75] 0 0 0 1 1 1 2 1 0 2 1 2 2 1 0 0 1 0 1 0 3 2 2 2 1 1 1 0 0 0 1 0 1 1 1 2 1
## [112] 2 0 1 0 3 0 1 0 1 4 0 0 0 1 0 1 2 3 2 1 1 0 3 0 0 4 1 0 1 1 0 1 0 2 0 0 1
## [149] 2 2 0 0 1 0 2 1 0 2 0 0 1 1 2 1 0 2 1 1 1 2 2 0 0 0 0 1 1 1 0 0 1 2 1 0 0
## [186] 1 0 0 4 2 1 2 0 1 3 0 2 0 0 0 1 1 1 1 0 0 3 2 2 0 1 1 0 0 1 0 1 0 0 1 3 0
## [223] 2 0 1 2 1 0 2 0 1 2 0 1 1 1 2 0 0 1 2 1 1 3 3 1 1 2 1 2 1 0 0 2 1 2 1 3 0
## [260] 0 2 1 1 0 0 1 1 2 0 0 0 1 3 1 1 0 1 0 1 0 1 0 3 3 2 0 0 1 3 0 2 0 1 1 1 2 1 0
```

```
## [297] 0 1 1 2 1 0 0 3 0 1 1 1 0 1 0 0 0 0 0 1 0 0 2 2 2 1 1 0 0 0 3 1 1 0 0 1 2
## [334] 0 2 1 0 0 0 0 1 0 0 1 0 2 0 1 0 2 1 0 3 0 0 0 1 3 1 2 1 2 0 2 0 1 1 1 0 1
## [371] 0 1 3 1 0 0 2 1 2 0 2 3 1 2 1 1 1 3 1 3 3 0 2 2 0 0 2 1 0 2 1 1 0 3 0 1 3
## [408] 3 0 3 2 0 2 2 2 0 0 1 0 1 1 1 1 0 1 0 2 2 1 0 1 1 2 0 1 0 0 0 0 0 2 1 0 1
## [445] 1 1 0 0 0 1 2 0 2 1 0 2 2 1 0 0 0 1 0 1 0 2 0 1 3 1 0 1 1 0 0 0 4 0 0 0 0
## [482] 3 3 0 1 0 1 1 2 0 1 0 0 1 1 1 0 0 3 1 1 0 1 1 1 1 1 1 1 1 2 0 0 2 0 1 1 1
## [519] 0 1 2 2 1 0 2 2 2 1 0 1 1 2 2 2 1 2 0 2 1 0 0 2 4 0 1 2 2 0 1 1 1 0
```

```
dweibull(df$Confirmed, shape=1, scale = 1, log = FALSE)
```

```
##    [1]  1.000000e+00  1.000000e+00  1.000000e+00  3.678794e-01  3.678794e-01
##    [6]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [11]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [16]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [21]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [26]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [31]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [36]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  2.478752e-03
##   [41]  3.354626e-04  1.000000e+00  1.353353e-01  4.978707e-02  1.000000e+00
##   [46]  1.353353e-01  4.978707e-02  1.000000e+00  1.000000e+00  3.678794e-01
##   [51]  6.144212e-06  6.144212e-06  3.059023e-07  6.914400e-13  8.315287e-07
##   [56]  1.234098e-04  5.602796e-09  1.154822e-17  2.478752e-03  2.061154e-09
##   [61]  1.266417e-14  9.118820e-04  3.775135e-11  7.582560e-10  1.234098e-04
##   [66]  1.670170e-05  3.354626e-04  2.260329e-06  3.354626e-04  1.234098e-04
##   [71]  6.144212e-06  9.118820e-04  4.539993e-05  1.353353e-01  4.978707e-02
##   [76]  3.354626e-04  3.678794e-01  9.118820e-04  3.678794e-01  1.831564e-02
##   [81]  1.353353e-01  2.478752e-03  5.602796e-09  1.670170e-05  4.539993e-05
##   [86]  4.978707e-02  9.118820e-04  1.670170e-05  2.260329e-06  1.831564e-02
##   [91]  4.539993e-05  1.353353e-01  1.000000e+00  1.353353e-01  1.000000e+00
##   [96]  1.000000e+00  4.978707e-02  1.000000e+00  1.000000e+00  3.678794e-01
##  [101]  1.353353e-01  9.118820e-04  9.118820e-04  6.737947e-03  4.539993e-05
##  [106]  5.109089e-12  1.125352e-07  1.670170e-05  8.315287e-07  2.543666e-13
##  [111]  6.144212e-06  3.775135e-11  3.775135e-11  5.749522e-19  1.185065e-27
##  [116]  9.602680e-24  5.242886e-22  7.984904e-30  4.248354e-18  1.216099e-37
##  [121]  1.185065e-27  6.470235e-26  3.221340e-27  1.758792e-25  4.473779e-38
##  [126]  2.442601e-36  1.500786e-41  6.213160e-49  1.247946e-47  3.392270e-47
##  [131]  3.014409e-40  3.014409e-40  5.900091e-29  8.985826e-37  1.333615e-34
##  [136]  1.216099e-37  3.532629e-24  2.442601e-36  4.906095e-35  2.678637e-33
##  [141]  7.471972e-43  5.665668e-52  6.991990e-56  1.733141e-58  1.167781e-60
##  [146]  5.814040e-62  9.710436e-67  3.817497e-54  7.175096e-66  2.053885e-85
##  [151]  5.665668e-52  1.037703e-53  1.280628e-57  2.639570e-66  3.257489e-70
##  [156]  2.311343e-92 5.879283e-105  1.921948e-98  1.517627e-84 7.445621e-119
##  [161] 1.893917e-131 5.945257e-148 2.155239e-181 1.159559e-212 1.207537e-189
##  [166] 1.004102e-195 8.891090e-265 2.719805e-271 2.750325e-314  0.000000e+00
##  [171] 2.906513e-258  0.000000e+00  0.000000e+00 2.032231e-313  0.000000e+00
##  [176]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 1.334362e-305
##  [181]  0.000000e+00  0.000000e+00 1.766006e-220  0.000000e+00  0.000000e+00
##  [186]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [191]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [196]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [201]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [206]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [211]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [216]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##  [221]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [226] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [231] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [236] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [241] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [246] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [251] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [256] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [261] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [266] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [271] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [276] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [281] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [286] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [291] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [296] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [301] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [306] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [311] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [316] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [321] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [326] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [331] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [336] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [341] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [346] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [351] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [356] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [361] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [366] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [371] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [376] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [381] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [386] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [391] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [396] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [401] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [406] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [411] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [416] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [421] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [426] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [431] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [436] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [441] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [446] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [451] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [456] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [461] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [466] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [471] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [476] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [481] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [486] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [491] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
```

```
## [496]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [501]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [506]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [511]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [516]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [521]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [526]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [531]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [536]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [541]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [546]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [551]  0.000000e+00  0.000000e+00
```

```r
dweibull(df$Recovered, shape=1, scale = 1, log = FALSE)
```

```
##   [1]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##   [6]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [11]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [16]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [21]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [26]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [31]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [36]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [41]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [46]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [51]  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00  1.000000e+00
##  [56]  1.000000e+00  1.000000e+00  4.978707e-02  3.354626e-04  1.831564e-02
##  [61]  1.000000e+00  1.831564e-02  1.353353e-01  1.353353e-01  8.315287e-07
##  [66]  3.354626e-04  2.478752e-03  4.978707e-02  6.144212e-06  2.260329e-06
##  [71]  2.260329e-06  1.879529e-12  5.602796e-09  2.319523e-16  5.602796e-09
##  [76]  2.260329e-06  9.118820e-04  1.879529e-12  4.539993e-05  1.353353e-01
##  [81]  2.260329e-06  7.582560e-10  1.125352e-07  3.678794e-01  3.354626e-04
##  [86]  3.059023e-07  9.118820e-04  1.831564e-02  2.260329e-06  1.831564e-02
##  [91]  4.539993e-05  8.315287e-07  1.234098e-04  3.354626e-04  3.678794e-01
##  [96]  3.221340e-27  1.000000e+00  9.118820e-04  6.737947e-03  4.539993e-05
## [101]  3.678794e-01  1.831564e-02  1.000000e+00  1.000000e+00  3.678794e-01
## [106]  4.978707e-02  1.000000e+00  1.831564e-02  1.000000e+00  1.000000e+00
## [111]  1.000000e+00  6.737947e-03  3.354626e-04  1.353353e-01  4.978707e-02
## [116]  6.737947e-03  6.144212e-06  4.539993e-05  4.539993e-05  4.978707e-02
## [121]  4.539993e-05  4.539993e-05  3.059023e-07  1.522998e-08  5.602796e-09
## [126]  3.775135e-11  1.154822e-17  2.789468e-10  1.928750e-22  1.562882e-18
## [131]  1.670170e-05  1.713908e-15  1.758792e-25  1.185065e-27  1.266417e-14
## [136]  1.053062e-20  4.780893e-25  1.979260e-32  8.756511e-27  8.194013e-40
## [141]  2.227364e-39  2.031093e-42  1.758792e-25  4.079559e-41  6.054602e-39
## [146]  8.756511e-27  6.639677e-36  9.602680e-24  5.900091e-29  5.034575e-45
## [151]  5.749522e-19  4.906095e-35  2.678637e-33  4.711166e-58  1.872900e-88
## [156]  5.091071e-88  1.707864e-91  1.900620e-55  2.970445e-73  8.408597e-50
## [161]  2.506567e-46  1.950393e-65  2.285694e-49  7.868448e-63  4.711166e-58
## [166]  4.408531e-71  2.470010e-79  7.555819e-86  9.568814e-100  1.733141e-58
## [171]  2.534695e-89  2.001470e-75  3.961430e-107  1.007655e-119  7.445621e-119
## [176]  2.425402e-188  0.000000e+00  0.000000e+00  5.903397e-300  4.940656e-324
## [181]  1.300310e-295  7.586809e-281  0.000000e+00  0.000000e+00  0.000000e+00
## [186]  1.604710e-299  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [191]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [196]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [201]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [206]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [211]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [216]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [221]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [226]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [231]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [236]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [241]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [246]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [251]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [256]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [261]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [266]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [271]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [276]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [281]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [286]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [291]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [296]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [301]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [306]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [311]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [316]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [321]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [326]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [331]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [336]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [411]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [416]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [421]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [426]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [431]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [436]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
```

```
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```
dweibull(df$Deceased, shape=1, scale = 1, log = FALSE)
```

```
##   [1] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##   [6] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [11] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [16] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [21] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [26] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [31] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [36] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [41] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [46] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [51] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [56] 1.000000e+00 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00
##  [61] 1.000000e+00 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00
##  [66] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [71] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [76] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [81] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [86] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [91] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
##  [96] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [101] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [106] 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [111] 1.000000e+00 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00
## [116] 3.678794e-01 3.678794e-01 1.000000e+00 1.000000e+00 3.678794e-01
## [121] 3.678794e-01 3.678794e-01 3.678794e-01 1.000000e+00 3.678794e-01
## [126] 1.000000e+00 4.978707e-02 1.000000e+00 3.678794e-01 1.000000e+00
## [131] 3.678794e-01 1.000000e+00 3.678794e-01 3.678794e-01 3.678794e-01
## [136] 1.000000e+00 1.000000e+00 3.678794e-01 1.000000e+00 1.000000e+00
## [141] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [146] 3.678794e-01 1.000000e+00 1.000000e+00 1.000000e+00 1.000000e+00
## [151] 1.000000e+00 3.678794e-01 3.678794e-01 3.678794e-01 1.000000e+00
## [156] 1.000000e+00 1.000000e+00 1.000000e+00 1.353353e-01 1.000000e+00
## [161] 1.000000e+00 1.000000e+00 1.000000e+00 1.353353e-01 1.353353e-01
## [166] 1.353353e-01 3.678794e-01 3.678794e-01 1.353353e-01 3.678794e-01
## [171] 1.353353e-01 1.353353e-01 3.678794e-01 3.678794e-01 3.678794e-01
```

```
## [176] 6.737947e-03 1.831564e-02 6.737947e-03 1.353353e-01 1.353353e-01
## [181] 1.831564e-02 3.678794e-01 1.353353e-01 4.978707e-02 3.354626e-04
## [186] 3.678794e-01 1.353353e-01 4.978707e-02 9.118820e-04 4.978707e-02
## [191] 6.737947e-03 1.831564e-02 1.353353e-01 9.118820e-04 6.737947e-03
## [196] 2.478752e-03 4.978707e-02 4.539993e-05 9.118820e-04 4.539993e-05
## [201] 2.260329e-06 2.478752e-03 9.118820e-04 1.234098e-04 6.144212e-06
## [206] 3.059023e-07 6.737947e-03 1.670170e-05 4.539993e-05 2.260329e-06
## [211] 4.539993e-05 9.118820e-04 2.478752e-03 9.118820e-04 9.118820e-04
## [216] 1.831564e-02 9.118820e-04 4.539993e-05 1.670170e-05 1.670170e-05
## [221] 4.539993e-05 6.144212e-06 2.260329e-06 6.144212e-06 6.144212e-06
## [226] 8.315287e-07 3.059023e-07 8.315287e-07 3.059023e-07 6.144212e-06
## [231] 8.315287e-07 1.234098e-04 6.144212e-06 1.522998e-08 1.125352e-07
## [236] 1.522998e-08 5.602796e-09 2.061154e-09 7.582560e-10 2.789468e-10
## [241] 7.582560e-10 7.582560e-10 2.061154e-09 2.789468e-10 1.026188e-10
## [246] 2.543666e-13 2.061154e-09 2.789468e-10 1.026188e-10 1.026188e-10
## [251] 1.388794e-11 2.789468e-10 3.775135e-11 1.388794e-11 1.026188e-10
## [256] 1.388794e-11 2.789468e-10 7.582560e-10 2.061154e-09 1.026188e-10
## [261] 3.775135e-11 5.109089e-12 2.789468e-10 7.582560e-10 3.775135e-11
## [266] 5.109089e-12 1.026188e-10 5.109089e-12 1.388794e-11 5.109089e-12
## [271] 2.061154e-09 3.775135e-11 1.879529e-12 5.109089e-12 6.914400e-13
## [276] 1.879529e-12 6.914400e-13 7.582560e-10 5.109089e-12 6.914400e-13
## [281] 5.109089e-12 1.879529e-12 6.914400e-13 3.775135e-11 2.789468e-10
## [286] 6.914400e-13 2.543666e-13 1.388794e-11 5.109089e-12 5.109089e-12
## [291] 7.582560e-10 5.602796e-09 1.879529e-12 6.914400e-13 5.109089e-12
## [296] 6.914400e-13 1.388794e-11 1.879529e-12 2.789468e-10 3.775135e-11
## [301] 5.109089e-12 1.879529e-12 1.026188e-10 1.388794e-11 1.879529e-12
## [306] 7.582560e-10 5.109089e-12 6.914400e-13 3.442477e-14 2.543666e-13
## [311] 1.266417e-14 6.914400e-13 1.026188e-10 3.442477e-14 6.305117e-16
## [316] 5.109089e-12 2.543666e-13 1.266417e-14 2.543666e-13 3.775135e-11
## [321] 4.658886e-15 1.879529e-12 1.879529e-12 1.026188e-10 2.543666e-13
## [326] 9.357623e-14 1.879529e-12 1.879529e-12 2.789468e-10 2.789468e-10
## [331] 1.125352e-07 7.582560e-10 1.388794e-11 8.315287e-07 3.775135e-11
## [336] 6.914400e-13 9.357623e-14 1.026188e-10 7.582560e-10 1.388794e-11
## [341] 5.602796e-09 3.775135e-11 1.388794e-11 1.388794e-11 1.026188e-10
## [346] 2.789468e-10 1.026188e-10 2.061154e-09 1.388794e-11 5.109089e-12
## [351] 5.602796e-09 1.026188e-10 1.879529e-12 7.582560e-10 4.139938e-08
## [356] 5.109089e-12 1.522998e-08 7.582560e-10 5.602796e-09 1.026188e-10
## [361] 2.061154e-09 4.139938e-08 5.602796e-09 2.061154e-09 5.602796e-09
## [366] 2.789468e-10 1.522998e-08 7.582560e-10 4.139938e-08 1.125352e-07
## [371] 2.061154e-09 4.139938e-08 5.602796e-09 1.125352e-07 5.602796e-09
## [376] 1.125352e-07 5.602796e-09 1.522998e-08 1.125352e-07 1.522998e-08
## [381] 1.125352e-07 3.059023e-07 2.260329e-06 1.522998e-08 1.125352e-07
## [386] 8.315287e-07 3.059023e-07 2.260329e-06 3.059023e-07 1.125352e-07
## [391] 8.315287e-07 4.139938e-08 8.315287e-07 8.315287e-07 1.522998e-08
## [396] 3.059023e-07 2.260329e-06 1.125352e-07 3.059023e-07 8.315287e-07
## [401] 1.125352e-07 1.125352e-07 2.260329e-06 6.144212e-06 1.125352e-07
## [406] 8.315287e-07 2.260329e-06 8.315287e-07 6.144212e-06 3.059023e-07
## [411] 1.670170e-05 3.059023e-07 2.260329e-06 3.059023e-07 4.139938e-08
## [416] 3.059023e-07 2.260329e-06 6.144212e-06 4.539993e-05 4.539993e-05
## [421] 6.144212e-06 8.315287e-07 8.315287e-07 6.144212e-06 1.670170e-05
## [426] 1.125352e-07 3.059023e-07 1.670170e-05 8.315287e-07 6.144212e-06
## [431] 4.539993e-05 6.144212e-06 8.315287e-07 1.125352e-07 1.522998e-08
## [436] 2.789468e-10 4.139938e-08 1.125352e-07 1.670170e-05 2.061154e-09
## [441] 2.789468e-10 2.061154e-09 7.582560e-10 1.879529e-12 1.388794e-11
```

```
## [446] 7.582560e-10 6.914400e-13 2.789468e-10 6.914400e-13 1.879529e-12
## [451] 1.388794e-11 9.357623e-14 6.914400e-13 1.266417e-14 1.562882e-18
## [456] 1.425164e-21 5.242886e-22 1.425164e-21 5.242886e-22 2.862519e-20
## [461] 1.758792e-25 6.470235e-26 4.359610e-28 3.532629e-24 1.603811e-28
## [466] 2.937482e-30 5.900091e-29 4.906095e-35 5.521082e-42 7.471972e-43
## [471] 4.079559e-41 2.031093e-42 2.227364e-39 1.645811e-38 7.471972e-43
## [476] 2.285694e-49 2.572209e-56 2.138866e-62 3.665820e-77 2.252358e-82
## [481] 7.555819e-86 1.348580e-77 2.639570e-66 2.470010e-79 5.583037e-85
## [486] 1.022569e-86 1.664280e-81 2.708695e-76 5.583037e-85 3.128062e-93
## [491] 3.572270e-67 2.345551e-59 1.707864e-91 2.601073e-99 2.311343e-92
## [496] 1.404379e-54 1.778528e-68 5.583037e-85 7.362997e-76 5.440560e-75
## [501] 3.430337e-90 1.198363e-70 8.074507e-73 1.441157e-64 6.054602e-39
## [506] 8.194013e-40 1.137980e-50 2.285694e-49 1.500786e-41 5.814040e-62
## [511] 7.175096e-66 8.628801e-60 5.665668e-52 5.665668e-52 1.185065e-27
## [516] 1.688912e-48 6.813557e-46 2.138866e-62 1.404379e-54 3.917470e-64
## [521] 2.345551e-59 9.854155e-34 5.034575e-45 2.138866e-62 5.301719e-65
## [526] 2.138866e-62 3.481107e-57 4.590938e-48 7.471972e-43 3.720076e-44
## [531] 1.404379e-54 2.572209e-56 1.645811e-38 3.481107e-57 3.093350e-50
## [536] 6.639677e-36 6.470235e-26 6.813557e-46 2.506567e-46 1.037703e-53
## [541] 4.711166e-58 2.748785e-43 2.170522e-29 2.345551e-59 1.778528e-68
## [546] 1.280628e-57 2.572209e-56 4.186394e-51 1.804851e-35 4.780893e-25
## [551] 5.665668e-52 5.301719e-65
```

```r
pweibull(df$Confirmed, shape=1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.6321206 0.6321206 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.9975212 0.9996645 0.0000000
##  [43] 0.8646647 0.9502129 0.0000000 0.8646647 0.9502129 0.0000000 0.0000000
##  [50] 0.6321206 0.9999939 0.9999939 0.9999997 1.0000000 0.9999992 0.9998766
##  [57] 1.0000000 1.0000000 0.9975212 1.0000000 1.0000000 0.9990881 1.0000000
##  [64] 1.0000000 0.9998766 0.9999833 0.9996645 0.9999977 0.9996645 0.9998766
##  [71] 0.9999939 0.9990881 0.9999546 0.8646647 0.9502129 0.9996645 0.6321206
##  [78] 0.9990881 0.6321206 0.9816844 0.8646647 0.9975212 1.0000000 0.9999833
##  [85] 0.9999546 0.9502129 0.9990881 0.9999833 0.9999977 0.9816844 0.9999546
##  [92] 0.8646647 0.0000000 0.8646647 0.0000000 0.0000000 0.9502129 0.0000000
##  [99] 0.0000000 0.6321206 0.8646647 0.9990881 0.9990881 0.9932621 0.9999546
## [106] 1.0000000 0.9999999 0.9999833 0.9999992 1.0000000 0.9999939 1.0000000
## [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pweibull(df$Recovered, shape=1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
```

```
##   [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [57] 0.0000000 0.9502129 0.9996645 0.9816844 0.0000000 0.9816844 0.8646647
##   [64] 0.8646647 0.9999992 0.9996645 0.9975212 0.9502129 0.9999939 0.9999977
##   [71] 0.9999977 1.0000000 1.0000000 1.0000000 1.0000000 0.9999977 0.9990881
##   [78] 1.0000000 0.9999546 0.8646647 0.9999977 1.0000000 0.9999999 0.6321206
##   [85] 0.9996645 0.9999997 0.9990881 0.9816844 0.9999977 0.9816844 0.9999546
##   [92] 0.9999992 0.9998766 0.9996645 0.6321206 1.0000000 0.0000000 0.9990881
##   [99] 0.9932621 0.9999546 0.6321206 0.9816844 0.0000000 0.0000000 0.6321206
##  [106] 0.9502129 0.0000000 0.9816844 0.0000000 0.0000000 0.0000000 0.9932621
##  [113] 0.9996645 0.8646647 0.9502129 0.9932621 0.9999939 0.9999546 0.9999546
##  [120] 0.9502129 0.9999546 0.9999546 0.9999997 1.0000000 1.0000000 1.0000000
##  [127] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999833 1.0000000 1.0000000
##  [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pweibull(df$Deceased, shape=1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.0000000 0.6321206 0.0000000 0.0000000 0.6321206 0.0000000
##  [64] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [71] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [78] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [85] 0.0000000 0.6321206 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [92] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [99] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [106] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [113] 0.0000000 0.6321206 0.0000000 0.6321206 0.6321206 0.0000000 0.0000000
## [120] 0.6321206 0.6321206 0.6321206 0.6321206 0.0000000 0.6321206 0.0000000
## [127] 0.9502129 0.0000000 0.6321206 0.0000000 0.6321206 0.0000000 0.6321206
## [134] 0.6321206 0.6321206 0.0000000 0.0000000 0.6321206 0.0000000 0.0000000
## [141] 0.6321206 0.0000000 0.0000000 0.0000000 0.0000000 0.6321206 0.0000000
## [148] 0.0000000 0.0000000 0.0000000 0.0000000 0.6321206 0.6321206 0.6321206
## [155] 0.0000000 0.0000000 0.0000000 0.0000000 0.8646647 0.0000000 0.0000000
## [162] 0.0000000 0.0000000 0.8646647 0.8646647 0.8646647 0.6321206 0.6321206
## [169] 0.8646647 0.6321206 0.8646647 0.8646647 0.6321206 0.6321206 0.6321206
## [176] 0.9932621 0.9816844 0.9932621 0.8646647 0.8646647 0.9816844 0.6321206
## [183] 0.8646647 0.9502129 0.9996645 0.6321206 0.8646647 0.9502129 0.9990881
## [190] 0.9502129 0.9932621 0.9816844 0.8646647 0.9990881 0.9932621 0.9975212
## [197] 0.9502129 0.9999546 0.9990881 0.9999546 0.9999977 0.9975212 0.9990881
## [204] 0.9998766 0.9999939 0.9999997 0.9932621 0.9999833 0.9999546 0.9999977
```

```
## [211] 0.9999546 0.9990881 0.9975212 0.9990881 0.9990881 0.9816844 0.9990881
## [218] 0.9999546 0.9999833 0.9999833 0.9999546 0.9999939 0.9999977 0.9999939
## [225] 0.9999939 0.9999992 0.9999997 0.9999992 0.9999997 0.9999939 0.9999992
## [232] 0.9998766 0.9999939 1.0000000 0.9999999 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 0.9999999 1.0000000 1.0000000 0.9999992 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000
## [372] 1.0000000 1.0000000 0.9999999 1.0000000 0.9999999 1.0000000 1.0000000
## [379] 0.9999999 1.0000000 0.9999999 0.9999997 0.9999977 1.0000000 0.9999999
## [386] 0.9999992 0.9999997 0.9999977 0.9999997 0.9999999 0.9999992 1.0000000
## [393] 0.9999992 0.9999992 1.0000000 0.9999997 0.9999977 0.9999999 0.9999997
## [400] 0.9999992 0.9999999 0.9999999 0.9999977 0.9999939 0.9999999 0.9999992
## [407] 0.9999977 0.9999992 0.9999939 0.9999997 0.9999833 0.9999997 0.9999977
## [414] 0.9999997 1.0000000 0.9999997 0.9999977 0.9999939 0.9999546 0.9999546
## [421] 0.9999939 0.9999992 0.9999992 0.9999939 0.9999833 0.9999999 0.9999997
## [428] 0.9999833 0.9999992 0.9999939 0.9999546 0.9999939 0.9999992 0.9999999
## [435] 1.0000000 1.0000000 1.0000000 0.9999999 0.9999833 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
qweibull(df$Confirmed, shape=1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qweibull(df$Confirmed, shape = 1, scale = 1, lower.tail = TRUE, :
## NaNs produced
```

```
##   [1]   0   0   0 Inf Inf   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0 Inf NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN Inf NaN Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0 Inf NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rweibull(df$Confirmed, shape=1, scale=1)
```

```
##   [1] 0.5918236588 1.7251790763 0.8875329578 0.2086468356 0.2505882400
##   [6] 0.6302835198 1.8221480468 1.4413363692 0.3754857647 0.5759148944
##  [11] 0.6435486529 0.4695278113 0.0924895241 0.6237115401 0.2038860993
##  [16] 1.7264647209 0.0341115188 1.2417012260 0.6042122492 0.4651276335
##  [21] 0.7828813455 0.6891649728 0.6650988599 2.0040583841 2.3086821674
##  [26] 1.3228322453 0.0672667421 0.8764310978 0.5695682327 1.6025128180
##  [31] 0.1485681728 0.4835400616 0.9942816491 0.6629963642 0.2959590800
##  [36] 0.3548826721 0.7878804416 0.3647286461 0.4950614343 0.2420311252
##  [41] 1.9894113200 0.3356389956 0.5566598667 0.1668599483 0.7827013190
##  [46] 1.5774807721 0.2420910810 1.9575553426 1.0434514400 0.2526587533
##  [51] 0.4717909487 0.1357620917 0.1378758342 0.1658287896 0.2913190441
##  [56] 0.8441938923 0.1082590496 1.3686510197 0.0362456910 2.7974561986
##  [61] 0.7250168514 1.2246916768 0.5294085769 1.4166312323 2.5474375900
##  [66] 0.6978488666 1.4913059810 1.1620954952 3.5208333936 2.8920533873
##  [71] 0.5240669246 0.4864488407 5.4297227581 0.0271683259 2.3920485478
##  [76] 0.3412198309 0.7661542054 2.2628039049 1.3847338808 0.6658691766
##  [81] 2.1883733907 1.6322539157 0.6830439057 2.1684968567 1.4623036915
##  [86] 0.3166746693 0.1580938362 0.3263877906 0.2587449389 1.3530297920
##  [91] 0.4086073987 1.9262565278 3.6176111175 5.8270787919 1.6551150850
##  [96] 4.2688846328 0.5085491416 1.6297690044 2.2961937189 1.3384333551
## [101] 0.0675047169 0.1494766676 0.7540319231 0.3402760784 0.3288615777
```

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```
## [106] 0.5191862582 2.9758123069 0.0184278561 0.2700119437 4.0147784293
## [111] 2.1463207187 2.2889793340 0.1225170399 0.1275095175 0.2582408990
## [116] 0.2960858549 1.8577398092 0.7823597336 3.0012261441 0.2616073057
## [121] 0.2260684948 0.0212398816 0.2143462402 0.4541387797 0.0766318179
## [126] 0.1691969568 0.1028876607 1.6423203201 0.3447477438 0.3828580251
## [131] 0.7699980947 1.4133924676 2.3594795072 0.9980208468 1.2506626361
## [136] 0.0813012145 1.7492140648 0.3107005322 0.4110228269 0.0300455653
## [141] 0.1644344217 0.6084494287 1.3431642437 0.7126609513 2.3672038079
## [146] 0.2665870022 1.1921227303 0.3314836841 0.5595612172 3.2603967020
## [151] 1.0489081057 1.5389483770 1.4839531630 0.1481503616 2.1707196194
## [156] 1.4983585367 0.4974158330 0.7135708372 0.3422018466 0.1369124657
## [161] 0.3012334354 0.6378277942 1.1221369258 2.1829314023 0.2584629104
## [166] 0.9202736628 0.3961772929 0.3020932242 1.4807273019 2.7829709742
## [171] 0.1194747314 1.2500442093 0.1313295496 0.1022830393 0.5413080035
## [176] 1.5521676662 1.9433593092 0.5087673233 2.0606560326 1.2630102819
## [181] 0.5240328661 1.0785292053 0.2059596728 0.3156389342 0.9939712406
## [186] 0.6057948221 0.8712360189 0.1312943578 0.8055762439 2.1082878221
## [191] 2.7074423000 0.7149083909 0.0498306307 0.1472047256 0.3272004530
## [196] 1.3824204915 2.0102937451 0.5446014603 0.3293169310 1.6205631129
## [201] 5.6403323484 0.7824341046 0.1828078425 0.7490769200 1.5930242541
## [206] 2.4566830767 1.1787445185 1.0766634034 1.0573819910 0.4992986303
## [211] 1.2349751397 0.0268507273 4.8236354699 1.9804354955 1.7209626583
## [216] 0.5012887909 0.2032816848 2.1749517672 1.1112164123 0.3134509229
## [221] 1.0502511741 0.1420350075 0.6577340853 1.3586720444 1.7480746056
## [226] 3.4482438300 0.0500617496 0.3077328380 4.3035761129 1.4334985773
## [231] 1.0071943098 0.0822008190 0.4977950520 0.0355327524 1.4808047574
## [236] 3.4597839403 0.3704042165 0.1615617076 0.6486760458 0.7750262743
## [241] 0.4798913857 1.2648117766 0.6116335935 0.0601609241 2.1222819619
## [246] 0.4484112236 2.1614086243 0.0531137013 1.1808799727 0.0551222814
## [251] 0.3943011284 0.0007057132 3.5061039021 0.1160961610 1.9537512474
## [256] 1.7142486233 0.0538157534 0.1580843533 0.1811688362 0.0752991999
## [261] 0.0804050582 0.6262574261 2.0380117812 0.0836604985 0.2433391663
## [266] 0.3881955866 0.8332304906 0.2561658263 0.6724299527 0.4248172541
## [271] 1.0806225972 0.4595902648 2.4518580653 3.2248448007 0.8765927398
## [276] 0.6942752729 0.3001411535 0.5694080188 0.3136063984 0.4882066152
## [281] 0.4141680825 0.8708818722 0.0721115837 0.7383925899 0.5422043626
## [286] 2.4576097486 0.2049259216 1.4509170237 0.5170616919 0.0806120749
## [291] 0.6955113311 0.5005241189 3.3829313296 0.6524838318 0.8420407796
## [296] 0.2469394238 0.0781013503 3.2586712854 0.2421308474 0.0751295758
## [301] 0.4203366246 1.2578531094 0.3459770762 0.2345522285 0.7561583900
## [306] 0.6468622704 2.5252664591 0.4005423009 0.2021717173 3.6817794437
## [311] 0.4391832592 0.1898266091 0.2749763057 1.5007814165 6.0078968959
## [316] 0.1700973374 0.1971815649 3.1637873526 3.1630976542 0.3746805610
## [321] 0.3071611666 1.0487319364 1.1915393700 1.0985797984 0.3079421793
## [326] 1.8253387168 2.5097553698 1.0408322699 0.0755900210 1.8087175740
## [331] 0.6415618929 0.7461075722 0.3941931447 4.1273666513 1.1959525597
## [336] 0.4974146097 0.6146956268 0.0161809056 0.5697492013 0.0523103250
## [341] 0.5156128420 0.3213120577 1.3133940797 1.7673463262 1.6649716615
## [346] 0.4610873400 1.6012594861 0.9981347735 1.3832739198 0.3667773892
## [351] 0.6713551598 0.8383232377 0.8182187130 0.6022266302 5.4484285553
## [356] 3.7109884440 0.2738463471 0.4143484722 1.0351713984 0.1599330868
## [361] 0.9168516207 1.1516492295 2.2150614231 0.4086702152 0.3996111630
## [366] 0.8231610054 0.8079973963 1.0107525412 0.1085070933 2.2528552382
## [371] 0.4331099754 1.8540732351 3.5087680060 0.0966717597 0.3670016702
```

```
## [376] 0.4234443522 3.4175424413 0.3034451440 0.6071203380 2.9158313284
## [381] 0.0880938018 2.1513449276 0.5862561517 1.2022108755 3.1113951629
## [386] 0.1501921173 0.1870274079 0.0826124444 4.5251372868 2.4636486474
## [391] 0.0914791567 0.0409262880 1.6822359578 0.1442162368 0.1184816130
## [396] 2.5441848393 0.7793279915 1.9443323463 0.2459979037 0.1071511092
## [401] 0.3996135053 0.4569832202 0.7303219996 0.4389903669 1.4187315204
## [406] 4.2347616995 0.8321623242 1.0398089505 0.3893745138 0.1190741395
## [411] 4.4106158726 5.8487616039 2.7022710633 0.4002302964 2.8169359478
## [416] 0.1931510203 0.2725591743 0.4758331828 0.5472832941 0.5816234130
## [421] 1.5139280401 0.3129401933 0.0706396217 0.6862753802 0.3102961634
## [426] 0.3226047993 0.1570506249 1.8893327653 0.2146103194 0.5352747499
## [431] 1.1224407085 3.4441429455 0.5093360521 0.5062089535 0.6547575326
## [436] 0.5066130450 0.1030758384 1.0730848494 0.2372381931 1.0537358335
## [441] 0.7513768343 0.6496463320 0.9990709537 0.9015987488 1.0695956525
## [446] 1.2195130954 1.0070303777 0.0625179047 1.8211243244 1.7965790034
## [451] 0.4395363427 1.3061246274 3.2913229024 0.5311781352 0.0707295168
## [456] 3.6899356416 1.1544863171 0.2115398940 0.1963216067 0.1160379651
## [461] 1.2494495619 0.9720007624 0.5323386041 0.6389367560 1.2004887074
## [466] 0.9789158856 0.2461515517 0.1322317467 0.1409769602 0.7561584842
## [471] 0.1076104606 0.3572383393 0.0260819474 0.1941272226 0.4127400948
## [476] 0.8538611877 0.5495362742 0.0847334016 0.4687810195 0.0390611052
## [481] 0.7214707043 1.0733649265 1.5298504355 2.0520669775 0.7124835222
## [486] 0.4010135690 0.4782034559 0.6260079473 0.5290114665 1.3483440568
## [491] 1.0302142576 0.0727997952 0.5228109244 2.0956744599 0.4332445539
## [496] 0.5995298033 2.3072446813 1.8601866831 0.0353609952 1.9663052353
## [501] 0.5180167249 2.8790736757 3.1978478025 0.0879932392 0.6339074907
## [506] 0.0595220422 0.9128680068 0.2841440487 0.0850094699 1.2523686565
## [511] 1.8202266465 1.4594733318 0.1380741929 0.9800737907 0.6950975847
## [516] 0.8254839691 1.3556709348 0.2453728409 0.9597036133 1.1397796217
## [521] 3.0264648753 2.3293564030 0.2389951058 0.5720349046 0.5579604410
## [526] 0.6036456913 0.4189202197 1.1104915719 0.9432560767 3.8532158178
## [531] 0.3097375883 1.8049453706 2.1547970240 3.3512375112 0.6835758792
## [536] 1.0896382108 2.1394151836 2.8152907501 0.4769061784 0.2917683361
## [541] 2.1869161530 0.3966176480 0.4880172668 0.4963209831 1.9788345347
## [546] 0.2013678908 0.5274371774 0.1891463187 0.3671680947 0.3501359088
## [551] 0.3612703859 1.7015560413
```

```r
rweibull(df$Recovered,shape=1,scale=1)
```

```
##   [1] 0.4557202411 1.5507306668 0.8515805698 0.5110040507 0.5736808111
##   [6] 2.0748351692 0.3041165414 0.1198909836 3.6036590073 0.0017993808
##  [11] 0.1828573890 0.9211138926 0.3522461216 0.2017776865 1.3916389815
##  [16] 0.1936365075 1.5572318580 0.5267063194 1.7684157692 1.5087440080
##  [21] 1.9204547618 1.6293077487 1.3131337930 0.8245715782 0.9535773494
##  [26] 2.0573083246 0.7908556500 3.2988439238 1.1097212431 0.1738030958
##  [31] 0.7286024013 0.1996074691 0.8612035156 1.4530473442 0.3528795983
##  [36] 0.8802329177 1.0335251863 0.8095996824 1.3090559346 0.2082454927
##  [41] 0.3667970413 0.2979033235 1.1303823365 0.2734302071 1.6530701596
##  [46] 3.1091016317 0.1284730614 2.0412871190 1.2180192308 1.2829456614
##  [51] 1.2589081843 1.3854113897 0.6841986298 2.7936962590 0.6461206927
##  [56] 0.8738578405 2.9626498958 0.6184871841 0.9082270166 0.2963096173
##  [61] 1.6758547444 1.1294324334 1.7726037894 2.2555070516 0.3922110052
##  [66] 0.0732072692 0.4080689512 0.2415837103 0.3636416548 0.1282509559
##  [71] 0.7218259461 0.4724590991 0.6724823081 0.4787978506 1.2606832126
##  [76] 0.8450019243 0.3884407113 0.6655148549 0.2074025747 0.3005470368
```

```
##  [81] 0.4200254458 0.7613370342 0.8027200898 0.8686677985 0.7947222927
##  [86] 1.0693518265 0.1303747000 2.3978487774 1.9166486918 0.3999256300
##  [91] 0.7237812911 1.2871154713 0.4224506216 0.9503126553 0.8228774047
##  [96] 0.7816777138 0.2494483481 0.0825747151 1.0891896313 0.6934692446
## [101] 1.4143942475 1.0067016651 1.9718713885 0.4689565180 0.0560180890
## [106] 1.1110170348 0.6057100941 0.7116044898 1.0260027581 0.1910647531
## [111] 0.5638206833 1.2730304555 0.3240625953 0.0149743383 0.5558659007
## [116] 0.2555745873 1.1516139691 2.1744062192 0.0075936346 1.9542195599
## [121] 1.8536195905 0.9491563617 0.5434768078 0.4989543853 0.7526150604
## [126] 0.3690086110 0.3183797432 0.2800565757 0.3634453146 0.0879530522
## [131] 2.0155707208 2.8468416525 0.0122129515 0.9574428781 0.3211454544
## [136] 0.3710422313 0.9767237708 2.4499257285 0.1769811884 2.7883779669
## [141] 1.7635221848 0.2700191782 0.3389948096 0.3938760198 1.4435525586
## [146] 0.3339513607 5.9848758879 0.3192435864 0.1644765241 0.3717953207
## [151] 1.2046587442 0.3237124314 0.4875011282 0.7160869094 0.6911312925
## [156] 0.1874627339 0.6437763880 0.3373241112 0.9316603227 0.1128271934
## [161] 2.5591515412 1.6770707919 1.0656863680 0.7450182503 1.1988310001
## [166] 1.5295377067 0.6493104297 0.7848439505 0.2389691746 0.8554682081
## [171] 0.4707805031 1.0752640597 1.3232791028 0.9914753258 0.8147501813
## [176] 0.5420220672 1.8635358505 0.9497008965 2.1819658036 0.4986438468
## [181] 2.4933708724 0.0010320431 0.2577853646 1.1703457177 1.2860227934
## [186] 1.5616931655 0.1242874252 0.8028498932 0.1600711411 1.1591432427
## [191] 0.0250360850 0.2872755114 2.5507852895 0.1495888173 0.3776161705
## [196] 1.1676287552 0.5400925086 1.0534057057 0.3039543003 0.2894331140
## [201] 0.1172782073 1.4921530366 3.5054625239 0.0011912804 0.3253266279
## [206] 4.4700293949 0.9086203415 2.5049785638 1.0085700768 0.5868508051
## [211] 1.5289782904 0.9967788088 3.3553981537 0.8535425972 1.8354163896
## [216] 1.5111321831 0.4272686669 1.2961777159 0.2098892075 0.3917270086
## [221] 5.1059964095 1.8092759878 0.7113900523 1.0627365987 0.5229946828
## [226] 1.7532213094 2.0232983907 0.9507592101 0.0180213461 0.5106930276
## [231] 0.0615379370 0.5972561541 1.0982893039 2.5741627630 3.5027274247
## [236] 1.8156232802 0.0957765268 0.3726783512 0.7010347480 0.3131690109
## [241] 0.0063046844 0.2167518516 0.4337769476 0.1072448310 1.7090353849
## [246] 0.0581426751 0.0340477631 1.5817523710 0.4505127109 1.5281060692
## [251] 0.1178470499 3.3523344264 0.7199097932 0.6858551473 1.1674527683
## [256] 0.0845456570 0.6185036932 0.3607770861 1.8663595332 0.6676602301
## [261] 1.8388184386 2.3415460016 1.3535417773 0.3394066908 0.1687802928
## [266] 0.0673456433 0.0994709988 0.2312676731 1.1298917809 0.6160607420
## [271] 0.2935307681 0.1454126618 0.6239778410 0.2626242615 0.1567049699
## [276] 0.0788679054 2.1519997872 1.5797642115 3.8071209664 0.2299003097
## [281] 0.0391844833 0.2905024455 0.1968255615 0.0493869538 0.6078599334
## [286] 0.0538392228 0.5874623467 0.2407024016 0.8528324091 0.8203343316
## [291] 1.2667557176 0.2674138568 0.0871181523 0.2029103093 0.3585099757
## [296] 0.9958971697 0.1376947169 2.1652526321 0.0390925435 2.9823322616
## [301] 0.2857274940 1.7473884962 0.1993357889 2.1029050066 0.6220807869
## [306] 1.6697265761 0.2322070140 0.8741949736 0.3115524774 0.5783705320
## [311] 0.2255678461 0.6361182428 1.0785023733 1.0206170847 0.2758086869
## [316] 0.3466168862 2.2416005134 0.6958521457 1.2709024365 0.5099033629
## [321] 0.2789905699 0.1890250187 2.8291129203 0.2752497473 1.2521696453
## [326] 0.2445635286 0.7822312630 0.5981624044 0.1522861315 0.1143922988
## [331] 0.0804084129 1.2188603044 0.1449494127 0.3862762471 1.1837365004
## [336] 0.9025216664 0.1524990105 2.0345300066 1.8837112830 0.0827587513
## [341] 1.1258824359 0.5535796230 0.3956550699 2.5973675564 0.7414832376
## [346] 0.3597002684 0.7654883606 1.8070611991 0.1489951878 0.4915408307
```

```
## [351] 0.0949793127 2.5266083967 0.0387660009 1.0864242966 0.5672860687
## [356] 0.3062055193 0.5024501276 4.7873004618 0.3638597004 2.0304012105
## [361] 0.0814231469 1.7113720053 3.5915692170 0.6757463894 2.1012559383
## [366] 0.2386132223 0.1754210948 0.1443596827 2.8108374945 5.2744272123
## [371] 0.1106392662 0.1627418447 1.1005854330 0.3249400057 2.0154683880
## [376] 1.5448392135 0.3947607332 0.4717916118 0.7588254006 0.4725795853
## [381] 3.5006686921 1.1034205404 1.2207648427 0.0005964632 1.2124070193
## [386] 1.3432590455 0.6092657759 0.1035906068 1.7063622213 4.0261711264
## [391] 0.2716533208 0.7419066414 0.2609780150 0.8437517885 0.2473903163
## [396] 0.2210879795 0.1453900964 1.5003523491 5.9384415921 0.2155569839
## [401] 0.0843466010 2.2244552591 2.6448160951 0.5303151924 0.6854677521
## [406] 0.3614285129 1.5715541068 1.0052010426 4.9294170145 0.4223621615
## [411] 0.1713373871 0.4739310533 0.5784032523 0.5477380915 0.1617232490
## [416] 0.8974383804 0.2887460774 1.0730155682 1.0190625071 1.5478083053
## [421] 0.3468425092 0.1048961684 0.3047695398 2.3280426148 1.0623335598
## [426] 2.3395469839 0.6932398715 0.7045417307 1.2772283961 1.8325508475
## [431] 0.7271215812 0.8108277164 0.4137806484 1.7828855853 3.4849493617
## [436] 0.8512762874 3.3930046883 1.6282094034 0.2965806772 0.3733325466
## [441] 2.4739329635 1.3204081704 1.8394207707 1.3297342702 0.0665715709
## [446] 0.1782505528 0.9861397666 0.5414010242 0.1758966690 0.9388815130
## [451] 1.7319296444 1.3331190442 0.2783089045 0.7262360583 0.0033638032
## [456] 0.3127358391 0.2803385037 0.8800056137 1.5130243297 0.9835957565
## [461] 0.9345146208 1.1911513004 0.1428374147 0.6407631303 2.0467833884
## [466] 2.3167383595 0.6121999747 0.6347761361 0.6219439039 3.4614810895
## [471] 0.3644082393 0.1131530932 0.1483939829 0.7727797716 2.4719988246
## [476] 1.5803085760 0.6413305955 0.5042267149 0.0041015650 2.2566812033
## [481] 0.1977441579 2.2470088611 0.1668596559 0.1124289870 1.3739589209
## [486] 3.3487411777 1.8458151562 0.4614917847 0.8771184476 0.5770514987
## [491] 0.0418925088 0.0872336656 0.2298846079 0.3062527304 0.4499876716
## [496] 0.6461150091 0.9701605892 1.5789407243 1.1127499968 1.7014665290
## [501] 1.4909807082 0.3921990063 0.5008373650 2.2879504600 0.5950517645
## [506] 0.9031224144 0.8526637606 1.1087025929 0.3292256311 1.1659597674
## [511] 0.4446577920 0.2829730517 0.0831479505 2.1688089857 1.4849674546
## [516] 0.9781425607 2.7518931841 0.9023173361 0.6330393760 0.3862772092
## [521] 1.9466088086 0.5848930226 0.0966889275 0.8521980836 1.0109013759
## [526] 1.5321518052 0.1949973612 1.1613539422 1.4860421935 3.1782911371
## [531] 1.5650308822 0.1819732508 0.8171742701 0.1748914285 1.4843456088
## [536] 4.9964485522 0.5592812044 1.5730450934 4.4463561044 0.5434860829
## [541] 0.7822448832 0.4580417639 0.2756756836 0.5819189331 0.5513410934
## [546] 0.5811298989 0.9615760254 0.9071543609 4.4934845701 0.0700946607
## [551] 0.0590772162 0.1864280566
```

```r
rweibull(df$Deceased,shape=1,scale=1)
```

```
##    [1] 0.615094552 0.965256731 0.080918790 0.334119167 0.992385611 0.930680192
##    [7] 2.069510821 0.353060579 1.299600043 0.623054958 1.517458624 3.438243565
##   [13] 0.289753194 0.553029774 2.144163129 0.638712282 0.648598256 0.187120900
##   [19] 1.093519527 1.832892088 3.518707351 0.759862465 1.030429993 0.353010316
##   [25] 0.204866435 0.006534433 0.508727390 0.596467817 0.670844568 0.010288366
##   [31] 0.067061611 3.288142004 0.539565294 3.099336984 1.448134144 0.856225742
##   [37] 2.102180761 0.627069231 0.782514272 0.043174783 0.470423074 1.016638319
##   [43] 1.168458037 3.548510180 1.151183798 0.407723681 0.742435070 0.030779458
##   [49] 0.039817786 0.019905365 0.356088759 0.072113340 0.197392181 0.853428074
##   [55] 2.725502331 1.042196678 0.189747901 0.277320667 0.205805291 0.824091684
##   [61] 0.641277441 0.293865217 0.176684406 1.038868876 1.009567238 0.650199281
```

```
##  [67] 0.175268737 1.201290406 0.351641179 1.502614351 0.193292084 0.873277400
##  [73] 1.088835623 1.367762253 3.096104820 0.714607421 0.764216352 0.818916927
##  [79] 1.173475781 0.919003013 1.061326529 0.247535544 0.064589046 0.528815059
##  [85] 1.579104795 1.982528803 0.996667655 1.415301576 0.073622642 0.424113026
##  [91] 0.865923245 0.686117497 0.065753947 2.199371716 0.993195301 0.257946366
##  [97] 2.292573347 0.536404635 0.042549975 0.757733505 2.101413806 0.754718837
## [103] 0.707709077 1.377715367 0.693418803 0.306586234 1.613887840 0.363337305
## [109] 0.390278443 0.121726248 0.105283882 0.743916502 0.122495108 0.068815832
## [115] 0.508756136 1.621656055 0.297375096 0.093452549 0.202158355 0.226735367
## [121] 0.417732888 0.989847451 0.244484681 1.166474360 0.510199430 0.764840539
## [127] 2.479766764 2.283343133 1.704400084 1.278887252 0.592663211 0.304063510
## [133] 1.558114994 1.369052241 0.088569387 0.345223525 0.217348264 0.336713904
## [139] 1.070040869 0.112093541 0.556330446 0.307373808 0.293517183 0.700859661
## [145] 1.751496489 1.107192729 0.975011186 0.857760980 1.360080035 3.224484218
## [151] 0.307158233 1.056862134 0.006091571 0.871026818 1.623441747 0.055657321
## [157] 0.404017567 0.749243102 0.808930294 2.163513250 0.623895418 0.255274905
## [163] 0.100844671 0.132137970 2.716268965 0.548808397 0.955003349 0.447532309
## [169] 0.046175048 1.349257177 1.800572826 0.551787517 0.334341060 0.947071092
## [175] 1.863343803 0.029228903 2.184470112 0.535378206 0.917207538 0.268842868
## [181] 1.357077534 0.271611699 0.556523717 3.971611980 0.020401800 3.061760072
## [187] 0.356181092 1.215220008 0.718485145 1.324392611 1.769830039 0.063530093
## [193] 0.473632144 0.001665033 2.160532813 2.185897660 2.984560515 2.316050148
## [199] 2.050237856 2.013896348 0.954483052 0.141972700 1.391566908 1.467919376
## [205] 3.037049293 1.282356102 0.030639012 0.750626810 0.364257835 0.788616101
## [211] 0.871357407 0.052092235 0.383783990 0.082596653 1.346726104 0.093758297
## [217] 0.774425180 0.875305242 0.563339938 0.027077644 0.019651012 0.011961985
## [223] 1.106713233 0.254505639 0.878555224 1.046843658 0.488248684 4.099635744
## [229] 0.094097576 0.732412290 0.640559142 1.492734770 4.653882157 0.450445819
## [235] 0.403025345 2.298179738 0.413029971 0.218977976 0.282679018 0.287607128
## [241] 1.394556964 1.889223296 0.401071331 0.327854704 0.532071829 0.077323838
## [247] 0.028549717 1.424732318 0.818262528 1.964859359 0.569171132 0.806632975
## [253] 0.847637210 0.845274056 0.165634445 0.309814382 0.737172144 0.491302200
## [259] 1.321144545 0.058856730 1.074962762 0.197001640 1.386782365 0.306542355
## [265] 1.100537272 0.581563990 1.847601164 1.210445712 0.122115096 0.677780809
## [271] 0.877060286 0.536520115 0.475111578 0.621801222 2.148635707 0.161522205
## [277] 5.011543967 1.002080587 0.094734305 3.224858239 0.406722444 1.721712602
## [283] 2.335440567 0.646136873 2.139217968 0.002756819 1.059088745 0.301851768
## [289] 0.033532108 0.171765801 0.626407506 1.286274521 0.981684814 0.089952427
## [295] 1.460005880 0.189490971 0.922249294 2.919646524 0.670748548 0.095208997
## [301] 0.893303841 0.243859880 0.235308137 1.315435495 0.841486433 0.320879562
## [307] 1.810124300 0.885408239 0.079082598 0.126861435 0.563924875 0.535042080
## [313] 0.810964226 0.075155932 0.345442681 2.922874470 0.166389448 0.241133950
## [319] 1.298133016 0.426108308 0.320360631 1.763320529 0.474682531 0.743354286
## [325] 2.476800751 1.855690447 1.191982323 0.500713674 1.636681039 2.223817111
## [331] 1.061806786 2.107977973 1.056791990 0.067618950 0.999582178 2.267103205
## [337] 1.796607754 1.724600211 1.333759360 0.824543834 2.241863566 0.139293796
## [343] 0.416642881 0.936981029 1.359591971 0.419210434 0.501980899 0.159832077
## [349] 3.298997200 1.709896525 0.012222194 1.207498039 1.938889291 0.417775954
## [355] 0.243330053 0.763257807 0.131827644 0.617300618 0.331543397 0.875749577
## [361] 0.281435077 0.748986283 2.263461448 2.319550885 1.592514705 3.114859965
## [367] 1.694664846 0.308142767 2.270127091 1.049717062 1.151964575 1.840840472
## [373] 0.284083007 0.293132082 0.247899985 0.366064336 0.088994473 0.564191294
## [379] 0.107674075 0.237822809 0.088869975 4.844185848 0.789615137 0.176161151
## [385] 1.136039342 0.443358257 0.818523690 1.572702332 0.426614677 1.083533424
```

```
## [391] 0.665921888 0.094402484 0.388376421 0.248932749 1.342466230 0.047576149
## [397] 1.637272159 1.322261309 4.170323871 0.701179957 1.655891920 0.659747042
## [403] 1.312362001 0.452630013 0.124482998 0.055404271 0.057117645 0.951408537
## [409] 0.775282147 0.914576107 2.082505452 0.062384852 0.063621514 0.683574282
## [415] 0.235077890 0.535781131 0.396094411 0.945449883 2.587080074 0.580396161
## [421] 0.168164299 0.067675539 0.572232797 2.754847958 0.041120266 0.181286524
## [427] 0.337812696 0.246667861 2.227739927 0.237240992 0.913294853 1.340265849
## [433] 0.318075783 0.810812302 0.527165420 1.186869031 0.049445116 0.710792571
## [439] 1.112814663 0.295202196 0.710955927 0.285865120 1.159368850 2.403894711
## [445] 0.194898642 2.097197224 0.951938561 1.088078716 1.876794410 5.210233420
## [451] 0.710487944 2.818108591 0.259297035 2.378989669 0.689336062 0.235417316
## [457] 0.051407930 0.085288992 0.907096352 0.347220902 0.444636384 1.446866333
## [463] 0.008792356 0.615033111 0.262802109 0.395053659 0.161819592 0.608711233
## [469] 0.200258286 0.922547963 1.085820659 0.479995246 0.694295289 1.029683422
## [475] 0.894089182 1.047876422 1.571354931 0.128560346 0.605165544 0.791856313
## [481] 0.872342228 0.816815179 0.444448448 0.148345280 0.445502664 1.299732091
## [487] 1.182294306 1.480657641 1.277070413 0.364452359 0.007281845 1.305691775
## [493] 0.273316861 0.755139359 0.647319280 0.286322692 0.426132367 1.146255982
## [499] 1.154293830 0.119646347 1.924008121 1.422633354 0.165154303 0.293761534
## [505] 1.946802125 0.511974488 0.941618427 0.578195516 0.246989402 0.457875744
## [511] 1.397097987 1.310054791 0.620466958 0.142270609 0.229830557 1.091310219
## [517] 0.272384941 0.378911308 0.554990837 0.302398469 1.114999774 2.859028654
## [523] 2.559232203 1.533162362 0.200312756 2.176659431 2.436354936 0.276888701
## [529] 5.198160458 0.488234557 0.638447809 0.388860066 0.664881791 0.209704147
## [535] 0.499992129 0.384448934 3.079266816 1.544922112 0.633451638 1.075460456
## [541] 0.547087979 0.290390888 1.056287214 0.556643867 0.224480615 0.869604970
## [547] 0.804867060 2.461230423 0.930552423 0.105256003 1.277721654 0.467404715
```

```
dcauchy(df$Confirmed, location = 0, scale = 1, log = FALSE)
```

```
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##   [6] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [11] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [16] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [21] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [26] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [31] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [36] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 8.602970e-03
##  [41] 4.897075e-03 3.183099e-01 6.366198e-02 3.183099e-02 3.183099e-01
##  [46] 6.366198e-02 3.183099e-02 3.183099e-01 3.183099e-01 1.591549e-01
##  [51] 2.195241e-03 2.195241e-03 1.408451e-03 4.054903e-04 1.615786e-03
##  [56] 3.881828e-03 8.793091e-04 2.091392e-04 8.602970e-03 7.937902e-04
##  [61] 3.105462e-04 6.366198e-03 5.516636e-04 7.201581e-04 3.881828e-03
##  [66] 2.609097e-03 4.897075e-03 1.872411e-03 4.897075e-03 3.881828e-03
##  [71] 2.195241e-03 6.366198e-03 3.151583e-03 6.366198e-02 3.183099e-02
##  [76] 4.897075e-03 1.591549e-01 6.366198e-03 1.591549e-01 1.872411e-02
##  [81] 6.366198e-02 8.602970e-03 8.793091e-04 2.609097e-03 3.151583e-03
##  [86] 3.183099e-02 6.366198e-03 2.609097e-03 1.872411e-03 1.872411e-02
##  [91] 3.151583e-03 6.366198e-02 3.183099e-01 6.366198e-02 3.183099e-01
##  [96] 3.183099e-01 3.183099e-02 3.183099e-01 3.183099e-01 1.591549e-01
## [101] 6.366198e-02 6.366198e-03 6.366198e-03 1.224269e-02 3.151583e-03
## [106] 4.701771e-04 1.238560e-03 2.609097e-03 1.615786e-03 3.780402e-04
## [111] 2.195241e-03 5.516636e-04 5.516636e-04 1.803455e-04 8.278541e-05
## [116] 1.132775e-04 1.325187e-04 7.089307e-05 1.988194e-04 4.405063e-05
## [121] 8.278541e-05 9.459432e-05 8.552119e-05 9.794150e-05 4.303230e-05
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## [151] 2.285888e-05 2.138461e-05 1.854737e-05 1.395974e-05 1.243349e-05
## [156] 7.149497e-06 5.526117e-06 6.287478e-06 8.545232e-06 4.302357e-06
## [161] 3.513277e-06 2.769791e-06 1.839336e-06 1.336622e-06 1.682168e-06
## [166] 1.578902e-06 8.610766e-07 8.201115e-07 6.106254e-07 5.087407e-07
## [171] 9.051895e-07 4.722404e-07 5.049036e-07 6.140225e-07 2.954303e-07
## [176] 2.739127e-07 4.064087e-07 2.616367e-07 3.704164e-07 6.459145e-07
## [181] 2.337266e-07 3.903679e-07 1.243218e-06 1.854844e-07 2.497249e-07
## [186] 2.329275e-07 3.439533e-07 2.713894e-07 2.229020e-07 1.889298e-07
## [191] 2.033926e-07 1.578604e-07 2.170509e-07 2.270630e-07 1.585295e-07
## [196] 2.166929e-07 1.301297e-07 1.293016e-07 1.231056e-07 1.359775e-07
## [201] 1.069724e-07 1.029941e-07 5.848178e-08 8.218638e-08 8.094771e-08
## [206] 6.747306e-08 8.743660e-08 2.063510e-07 5.643166e-08 5.192168e-08
## [211] 5.498685e-08 4.922178e-08 5.540054e-08 6.860545e-08 1.359775e-07
## [216] 2.449289e-07 1.330054e-07 1.319797e-07 5.179609e-08 4.515658e-08
## [221] 3.351080e-08 1.172021e-07 3.476260e-08 2.750309e-08 2.838048e-08
## [226] 3.565241e-08 3.824357e-08 3.230483e-08 4.933812e-08 3.079556e-08
## [231] 2.169964e-08 1.681403e-08 1.833172e-08 1.475930e-08 1.443424e-08
## [236] 3.758929e-08 1.870692e-08 1.101366e-08 7.959145e-09 7.587563e-09
## [241] 6.484998e-09 5.742761e-09 1.545685e-08 5.885764e-09 4.082524e-09
## [246] 4.809888e-09 3.713777e-09 5.186603e-09 4.351241e-09 1.252116e-08
## [251] 5.137955e-09 2.829742e-09 1.073629e-08 3.720203e-09 2.303588e-09
## [256] 3.643390e-09 9.051920e-09 4.144245e-09 8.164401e-09 5.246706e-09
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## [266] 4.544677e-09 5.686103e-09 4.394292e-09 4.673330e-09 6.797622e-09
## [271] 1.731981e-08 1.068913e-08 4.119764e-09 6.459158e-09 7.223965e-09
## [276] 4.994797e-09 6.449967e-09 1.858956e-08 6.760031e-09 4.389134e-09
## [281] 6.843549e-09 6.492410e-09 6.138532e-09 1.075604e-08 2.465674e-08
## [286] 8.812541e-09 6.483147e-09 1.038248e-08 9.449206e-09 7.876725e-09
## [291] 1.516804e-08 4.334225e-08 9.488401e-09 7.725300e-09 9.721973e-09
## [296] 8.759990e-09 9.554269e-09 1.153108e-08 2.255110e-08 1.083556e-08
## [301] 7.554868e-09 1.100547e-08 2.023693e-08 8.148733e-09 9.996087e-09
## [306] 2.782934e-08 1.101776e-08 7.979320e-09 1.101366e-08 9.735580e-09
## [311] 9.307550e-09 1.394889e-08 2.973196e-08 1.257097e-08 1.339371e-08
## [316] 1.593071e-08 1.477202e-08 8.994192e-09 1.442195e-08 4.343837e-08
## [321] 1.169074e-08 8.320908e-09 1.289176e-08 1.069304e-08 8.037753e-09
## [326] 9.759460e-09 2.716666e-08 8.699273e-09 8.364126e-09 1.187665e-08
## [331] 1.092812e-08 2.558817e-08 1.323037e-08 3.428508e-08 9.184638e-09
## [336] 8.101998e-09 1.170419e-08 1.277836e-08 1.121300e-08 1.504300e-08
## [341] 3.487776e-08 1.009603e-08 7.785829e-09 1.247657e-08 1.203888e-08
## [346] 1.041631e-08 1.540928e-08 3.291011e-08 1.049591e-08 8.830164e-09
## [351] 1.056101e-08 1.006374e-08 8.961023e-09 1.270697e-08 2.843140e-08
## [356] 8.318218e-09 6.853594e-09 7.934033e-09 6.980019e-09 6.571003e-09
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## [366] 8.101998e-09 8.065926e-09 1.147859e-08 2.660412e-08 9.742394e-09
## [371] 7.879204e-09 8.548811e-09 1.011403e-08 9.015396e-09 8.624969e-09
## [376] 2.273226e-08 1.170868e-08 8.901183e-09 1.141347e-08 1.092812e-08
## [381] 1.063449e-08 1.496482e-08 3.827010e-08 1.305942e-08 1.330078e-08
## [386] 1.514820e-08 1.568413e-08 1.472123e-08 1.921592e-08 6.505487e-08
## [391] 1.956043e-08 1.888044e-08 2.354306e-08 2.362008e-08 2.213673e-08
```

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## [396] 3.006180e-08 8.475054e-08 3.687623e-08 4.163512e-08 4.651302e-08
## [401] 4.130581e-08 4.086301e-08 7.217910e-08 1.596543e-07 5.934347e-08
## [406] 5.196365e-08 6.996298e-08 1.004639e-07 7.686368e-08 9.912290e-08
## [411] 2.865290e-07 8.201958e-08 7.231678e-08 8.826735e-08 8.086613e-08
## [416] 7.371552e-08 9.054145e-08 2.073515e-07 8.078468e-08 5.277076e-08
## [421] 8.046008e-08 9.557059e-08 7.537483e-08 6.482022e-08 1.326622e-07
## [426] 5.577220e-08 4.522469e-08 4.065881e-08 5.060518e-08 4.929930e-08
## [431] 4.054281e-08 5.729687e-08 2.595481e-08 2.595481e-08 1.679859e-08
## [436] 1.241750e-08 8.296744e-09 6.522183e-09 9.824723e-09 5.636275e-09
## [441] 4.131036e-09 4.820549e-09 3.163455e-09 1.662998e-09 9.549734e-10
## [446] 1.709884e-09 8.305348e-10 6.335945e-10 4.368008e-10 3.933482e-10
## [451] 4.470084e-10 3.927405e-10 6.642914e-10 2.955285e-10 2.596519e-10
## [456] 2.135591e-10 2.300317e-10 2.506526e-10 3.116476e-10 4.704744e-10
## [461] 2.301430e-10 1.808523e-10 1.765259e-10 2.151947e-10 1.806972e-10
## [466] 2.483475e-10 4.213039e-10 2.289103e-10 1.679936e-10 1.993921e-10
## [471] 2.644487e-10 2.980479e-10 3.607616e-10 6.949306e-10 3.241420e-10
## [476] 2.965578e-10 3.423787e-10 3.615157e-10 3.915019e-10 4.774607e-10
## [481] 1.002273e-09 3.583688e-10 3.838181e-10 5.450553e-10 6.390570e-10
## [486] 5.757501e-10 8.042775e-10 2.103972e-09 8.152227e-10 8.234532e-10
## [491] 8.955487e-10 1.208556e-09 1.060116e-09 1.478671e-09 3.670041e-09
## [496] 1.313531e-09 1.212288e-09 1.529955e-09 1.571293e-09 1.663720e-09
## [501] 2.372100e-09 5.342297e-09 2.122568e-09 1.807625e-09 2.047325e-09
## [506] 2.466136e-09 2.055890e-09 2.346508e-09 5.736595e-09 1.999576e-09
## [511] 1.946762e-09 2.182027e-09 2.387740e-09 2.167645e-09 2.676694e-09
## [516] 4.896174e-09 1.733690e-09 1.706381e-09 1.922330e-09 2.175897e-09
## [521] 2.051601e-09 2.174099e-09 4.927903e-09 1.540832e-09 1.307979e-09
## [526] 1.678248e-09 1.730369e-09 1.604032e-09 2.131610e-09 5.234602e-09
## [531] 1.505848e-09 1.301797e-09 1.678004e-09 1.683623e-09 1.220710e-09
## [536] 1.634287e-09 3.227484e-09 1.121382e-09 1.041640e-09 1.937357e-09
## [541] 1.037244e-09 9.269417e-10 1.043430e-09 2.371281e-09 6.500197e-10
## [546] 6.543297e-10 6.538553e-10 7.377233e-10 7.483492e-10 7.408586e-10
## [551] 1.627748e-09 5.678498e-10
```

```r
dcauchy(df$Recovered, location = 0, scale = 1, log = FALSE)
```

```
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##   [6] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [11] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [16] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [21] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [26] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [31] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [36] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [41] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [46] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [51] 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01 3.183099e-01
##  [56] 3.183099e-01 3.183099e-01 3.183099e-02 4.897075e-03 1.872411e-02
##  [61] 3.183099e-01 1.872411e-02 6.366198e-02 6.366198e-02 1.615786e-03
##  [66] 4.897075e-03 8.602970e-03 3.183099e-02 2.195241e-03 1.872411e-03
##  [71] 1.872411e-03 4.360409e-04 8.793091e-04 2.454201e-04 8.793091e-04
##  [76] 1.872411e-03 6.366198e-03 4.360409e-04 3.151583e-03 6.366198e-02
##  [81] 1.872411e-03 7.201581e-04 1.238560e-03 1.591549e-01 4.897075e-03
##  [86] 1.408451e-03 6.366198e-03 1.872411e-02 1.872411e-03 1.872411e-02
##  [91] 3.151583e-03 1.615786e-03 3.881828e-03 4.897075e-03 1.591549e-01
##  [96] 8.552119e-05 3.183099e-01 6.366198e-03 1.224269e-02 3.151583e-03
```

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```
## [101] 1.591549e-01 1.872411e-02 3.183099e-01 3.183099e-01 1.591549e-01
## [106] 3.183099e-02 3.183099e-01 1.872411e-02 3.183099e-01 3.183099e-01
## [111] 3.183099e-01 1.224269e-02 4.897075e-03 6.366198e-02 3.183099e-02
## [116] 1.224269e-02 2.195241e-03 3.151583e-03 3.151583e-03 3.183099e-02
## [121] 3.151583e-03 3.151583e-03 1.408451e-03 9.794150e-04 8.793091e-04
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## [506] 3.929267e-05 2.406698e-05 2.537345e-05 3.602013e-05 1.600995e-05
## [511] 1.414648e-05 1.720873e-05 2.285888e-05 2.285888e-05 8.278541e-05
## [516] 2.630443e-05 2.942682e-05 1.578527e-05 2.070039e-05 1.493221e-05
## [521] 1.746460e-05 5.509951e-05 3.059201e-05 1.578527e-05 1.453138e-05
## [526] 1.578527e-05 1.883379e-05 2.678925e-05 3.382677e-05 3.182781e-05
## [531] 2.070039e-05 1.942691e-05 4.204886e-05 1.883379e-05 2.449103e-05
## [536] 4.850806e-05 9.459432e-05 2.942682e-05 2.886903e-05 2.138461e-05
## [541] 1.826743e-05 3.314002e-05 7.305712e-05 1.746460e-05 1.307926e-05
## [546] 1.854737e-05 1.942691e-05 2.365385e-05 4.972815e-05 1.014695e-04
## [551] 2.285888e-05 1.453138e-05
```

```
pcauchy(df$Confirmed, location = 0, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##  [1] 0.5000000 0.5000000 0.5000000 0.7500000 0.7500000 0.5000000 0.5000000
##  [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [36] 0.5000000 0.5000000 0.5000000 0.5000000 0.9474315 0.9604166 0.5000000
## [43] 0.8524164 0.8975836 0.5000000 0.8524164 0.8975836 0.5000000 0.5000000
## [50] 0.7500000 0.9735353 0.9735353 0.9788107 0.9886366 0.9773021 0.9647767
## [57] 0.9832623 0.9918400 0.9474315 0.9840977 0.9900561 0.9548328 0.9867448
## [64] 0.9848538 0.9647767 0.9711421 0.9604166 0.9755627 0.9604166 0.9647767
```

```
##  [71] 0.9735353 0.9548328 0.9682745 0.8524164 0.8975836 0.9604166 0.7500000
##  [78] 0.9548328 0.7500000 0.9220209 0.8524164 0.9474315 0.9832623 0.9711421
##  [85] 0.9682745 0.8975836 0.9548328 0.9711421 0.9755627 0.9220209 0.9682745
##  [92] 0.8524164 0.5000000 0.8524164 0.5000000 0.5000000 0.8975836 0.5000000
##  [99] 0.5000000 0.7500000 0.8524164 0.9548328 0.9548328 0.9371670 0.9682745
## [106] 0.9877633 0.9801315 0.9711421 0.9773021 0.9890281 0.9735353 0.9867448
## [113] 0.9867448 0.9924226 0.9948664 0.9939949 0.9935048 0.9952495 0.9920439
## [120] 0.9962554 0.9948664 0.9945124 0.9947823 0.9944162 0.9962989 0.9961184
## [127] 0.9966139 0.9971324 0.9970528 0.9970252 0.9965022 0.9965022 0.9951033
## [134] 0.9961651 0.9959193 0.9962554 0.9941060 0.9961184 0.9959710 0.9957561
## [141] 0.9967186 0.9973025 0.9974937 0.9976067 0.9976934 0.9977425 0.9979059
## [148] 0.9974122 0.9978780 0.9983677 0.9973025 0.9973910 0.9975702 0.9978920
## [155] 0.9980106 0.9984914 0.9986737 0.9985853 0.9983507 0.9988297 0.9989425
## [162] 0.9990610 0.9992348 0.9993477 0.9992683 0.9992911 0.9994765 0.9994891
## [169] 0.9995591 0.9995976 0.9994632 0.9996123 0.9995991 0.9995579 0.9996933
## [176] 0.9997047 0.9996403 0.9997114 0.9996566 0.9995466 0.9997272 0.9996475
## [183] 0.9993709 0.9997570 0.9997181 0.9997277 0.9996691 0.9997061 0.9997336
## [190] 0.9997548 0.9997456 0.9997758 0.9997372 0.9997312 0.9997754 0.9997374
## [197] 0.9997965 0.9997971 0.9998020 0.9997920 0.9998155 0.9998189 0.9998636
## [204] 0.9998383 0.9998395 0.9998534 0.9998332 0.9997437 0.9998660 0.9998714
## [211] 0.9998677 0.9998748 0.9998672 0.9998522 0.9997920 0.9997208 0.9997942
## [218] 0.9997950 0.9998716 0.9998801 0.9998967 0.9998069 0.9998948 0.9999064
## [225] 0.9999050 0.9998935 0.9998897 0.9998986 0.9998747 0.9999010 0.9999169
## [232] 0.9999268 0.9999236 0.9999315 0.9999322 0.9998906 0.9999228 0.9999408
## [239] 0.9999497 0.9999509 0.9999546 0.9999572 0.9999299 0.9999567 0.9999640
## [246] 0.9999609 0.9999656 0.9999594 0.9999628 0.9999369 0.9999596 0.9999700
## [253] 0.9999415 0.9999656 0.9999729 0.9999659 0.9999463 0.9999637 0.9999490
## [260] 0.9999591 0.9999563 0.9999647 0.9999583 0.9999366 0.9999517 0.9999620
## [267] 0.9999575 0.9999626 0.9999614 0.9999535 0.9999257 0.9999417 0.9999638
## [274] 0.9999547 0.9999520 0.9999601 0.9999547 0.9999231 0.9999536 0.9999626
## [281] 0.9999533 0.9999545 0.9999558 0.9999415 0.9999114 0.9999470 0.9999546
## [288] 0.9999425 0.9999452 0.9999499 0.9999305 0.9998825 0.9999450 0.9999504
## [295] 0.9999444 0.9999472 0.9999449 0.9999394 0.9999153 0.9999413 0.9999510
## [302] 0.9999408 0.9999197 0.9999491 0.9999436 0.9999059 0.9999408 0.9999496
## [309] 0.9999408 0.9999443 0.9999456 0.9999334 0.9999027 0.9999367 0.9999347
## [316] 0.9999288 0.9999314 0.9999465 0.9999322 0.9998824 0.9999390 0.9999485
## [323] 0.9999359 0.9999417 0.9999494 0.9999443 0.9999070 0.9999474 0.9999484
## [330] 0.9999385 0.9999410 0.9999098 0.9999351 0.9998955 0.9999459 0.9999492
## [337] 0.9999390 0.9999362 0.9999403 0.9999308 0.9998946 0.9999433 0.9999502
## [344] 0.9999370 0.9999381 0.9999424 0.9999300 0.9998976 0.9999422 0.9999470
## [351] 0.9999420 0.9999434 0.9999466 0.9999364 0.9999049 0.9999485 0.9999533
## [358] 0.9999497 0.9999529 0.9999543 0.9999473 0.9999053 0.9999494 0.9999438
## [365] 0.9999448 0.9999492 0.9999493 0.9999396 0.9999080 0.9999443 0.9999499
## [372] 0.9999478 0.9999433 0.9999464 0.9999476 0.9999149 0.9999390 0.9999468
## [379] 0.9999397 0.9999410 0.9999418 0.9999310 0.9998896 0.9999355 0.9999349
## [386] 0.9999306 0.9999293 0.9999315 0.9999218 0.9998561 0.9999211 0.9999225
## [393] 0.9999134 0.9999133 0.9999161 0.9999022 0.9998358 0.9998917 0.9998849
## [400] 0.9998783 0.9998853 0.9998860 0.9998484 0.9997746 0.9998626 0.9998714
## [407] 0.9998508 0.9998212 0.9998436 0.9998224 0.9996980 0.9998384 0.9998483
## [414] 0.9998324 0.9998396 0.9998468 0.9998302 0.9997431 0.9998396 0.9998704
## [421] 0.9998400 0.9998256 0.9998451 0.9998564 0.9997945 0.9998668 0.9998800
## [428] 0.9998862 0.9998731 0.9998747 0.9998864 0.9998650 0.9999091 0.9999091
## [435] 0.9999269 0.9999371 0.9999486 0.9999544 0.9999441 0.9999576 0.9999637
## [442] 0.9999608 0.9999683 0.9999770 0.9999826 0.9999767 0.9999837 0.9999858
```

```
## [449] 0.9999882 0.9999888 0.9999881 0.9999888 0.9999855 0.9999903 0.9999909
## [456] 0.9999918 0.9999914 0.9999911 0.9999900 0.9999878 0.9999914 0.9999924
## [463] 0.9999925 0.9999917 0.9999924 0.9999911 0.9999884 0.9999915 0.9999927
## [470] 0.9999920 0.9999908 0.9999903 0.9999893 0.9999851 0.9999898 0.9999903
## [477] 0.9999896 0.9999893 0.9999888 0.9999877 0.9999821 0.9999893 0.9999889
## [484] 0.9999868 0.9999857 0.9999865 0.9999840 0.9999741 0.9999839 0.9999838
## [491] 0.9999831 0.9999804 0.9999816 0.9999783 0.9999658 0.9999796 0.9999804
## [498] 0.9999779 0.9999776 0.9999770 0.9999725 0.9999588 0.9999740 0.9999760
## [505] 0.9999745 0.9999720 0.9999744 0.9999727 0.9999573 0.9999748 0.9999751
## [512] 0.9999736 0.9999724 0.9999737 0.9999708 0.9999605 0.9999765 0.9999767
## [519] 0.9999753 0.9999737 0.9999744 0.9999737 0.9999604 0.9999779 0.9999796
## [526] 0.9999769 0.9999765 0.9999774 0.9999740 0.9999592 0.9999781 0.9999796
## [533] 0.9999769 0.9999769 0.9999803 0.9999772 0.9999679 0.9999811 0.9999818
## [540] 0.9999752 0.9999818 0.9999828 0.9999818 0.9999725 0.9999856 0.9999856
## [547] 0.9999856 0.9999847 0.9999846 0.9999846 0.9999772 0.9999866
```

```r
pcauchy(df$Recovered, location = 0, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##   [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [36] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [43] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [50] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [57] 0.5000000 0.8975836 0.9604166 0.9220209 0.5000000 0.9220209 0.8524164
##  [64] 0.8524164 0.9773021 0.9604166 0.9474315 0.8975836 0.9735353 0.9755627
##  [71] 0.9755627 0.9882161 0.9832623 0.9911603 0.9832623 0.9755627 0.9548328
##  [78] 0.9882161 0.9682745 0.8524164 0.9755627 0.9848538 0.9801315 0.7500000
##  [85] 0.9604166 0.9788107 0.9548328 0.9220209 0.9755627 0.9220209 0.9682745
##  [92] 0.9773021 0.9647767 0.9604166 0.7500000 0.9947823 0.5000000 0.9548328
##  [99] 0.9371670 0.9682745 0.7500000 0.9220209 0.5000000 0.5000000 0.7500000
## [106] 0.8975836 0.5000000 0.9220209 0.5000000 0.5000000 0.5000000 0.9371670
## [113] 0.9604166 0.8524164 0.8975836 0.9371670 0.9735353 0.9682745 0.9682745
## [120] 0.8975836 0.9682745 0.9682745 0.9788107 0.9823343 0.9832623 0.9867448
## [127] 0.9918400 0.9855413 0.9936347 0.9922379 0.9711421 0.9906406 0.9944162
## [134] 0.9948664 0.9900561 0.9930813 0.9943165 0.9956399 0.9946953 0.9964634
## [141] 0.9964236 0.9966844 0.9944162 0.9965774 0.9963830 0.9946953 0.9960704
## [148] 0.9939949 0.9951033 0.9968794 0.9924226 0.9959710 0.9957561 0.9975886
## [155] 0.9984242 0.9984164 0.9984770 0.9974738 0.9980940 0.9971832 0.9969686
## [162] 0.9978637 0.9971580 0.9977741 0.9975886 0.9980351 0.9982414 0.9983760
## [169] 0.9986039 0.9976067 0.9984397 0.9981494 0.9987008 0.9988383 0.9988297
## [176] 0.9992632 0.9996712 0.9996966 0.9995380 0.9995727 0.9995312 0.9995065
## [183] 0.9995971 0.9996316 0.9995767 0.9995373 0.9996094 0.9996882 0.9997421
## [190] 0.9996021 0.9996090 0.9998144 0.9996718 0.9995940 0.9997768 0.9996383
## [197] 0.9995845 0.9997559 0.9996036 0.9997104 0.9997186 0.9997668 0.9997384
## [204] 0.9997384 0.9997757 0.9997536 0.9997132 0.9997429 0.9997814 0.9997644
## [211] 0.9998460 0.9998482 0.9998569 0.9998198 0.9998120 0.9998492 0.9998505
## [218] 0.9998368 0.9998828 0.9998492 0.9998551 0.9998583 0.9998290 0.9998453
## [225] 0.9998079 0.9997599 0.9998363 0.9998284 0.9998491 0.9998743 0.9998593
## [232] 0.9998837 0.9998840 0.9998888 0.9998843 0.9998948 0.9998941 0.9998921
## [239] 0.9998995 0.9999086 0.9999005 0.9999061 0.9999049 0.9999069 0.9999100
## [246] 0.9998874 0.9999222 0.9999289 0.9999344 0.9999314 0.9999361 0.9999483
## [253] 0.9999545 0.9999604 0.9999580 0.9999643 0.9999594 0.9999588 0.9999591
```

```
## [260] 0.9999551 0.9999530 0.9999602 0.9999622 0.9999574 0.9999568 0.9999535
## [267] 0.9999581 0.9999480 0.9999508 0.9999584 0.9999552 0.9999546 0.9999584
## [274] 0.9999624 0.9999593 0.9999566 0.9999626 0.9999552 0.9999638 0.9999612
## [281] 0.9999587 0.9999595 0.9999553 0.9999536 0.9999468 0.9999525 0.9999561
## [288] 0.9999480 0.9999487 0.9999531 0.9999524 0.9999515 0.9999519 0.9999550
## [295] 0.9999536 0.9999502 0.9999526 0.9999489 0.9999413 0.9999382 0.9999448
## [302] 0.9999467 0.9999299 0.9999397 0.9999457 0.9999474 0.9999483 0.9999463
## [309] 0.9999431 0.9999421 0.9999453 0.9999390 0.9999323 0.9999328 0.9999315
## [316] 0.9999343 0.9999330 0.9999396 0.9999395 0.9999290 0.9999372 0.9999444
## [323] 0.9999360 0.9999323 0.9999330 0.9999288 0.9999292 0.9999371 0.9999338
## [330] 0.9999337 0.9999294 0.9999158 0.9999081 0.9999237 0.9999367 0.9999442
## [337] 0.9999408 0.9999377 0.9999361 0.9999318 0.9999381 0.9999353 0.9999377
## [344] 0.9999436 0.9999402 0.9999413 0.9999317 0.9999188 0.9999255 0.9999383
## [351] 0.9999266 0.9999308 0.9999365 0.9999278 0.9999188 0.9999259 0.9999568
## [358] 0.9999489 0.9999479 0.9999397 0.9999385 0.9999432 0.9999398 0.9999364
## [365] 0.9999431 0.9999502 0.9999547 0.9999444 0.9999390 0.9999446 0.9999501
## [372] 0.9999498 0.9999522 0.9999485 0.9999465 0.9999466 0.9999508 0.9999446
## [379] 0.9999441 0.9999403 0.9999454 0.9999322 0.9999373 0.9999415 0.9999341
## [386] 0.9999387 0.9999344 0.9999455 0.9999267 0.9999368 0.9999340 0.9999459
## [393] 0.9999316 0.9999232 0.9999315 0.9999265 0.9999084 0.9999094 0.9999210
## [400] 0.9999234 0.9999125 0.9999095 0.9999212 0.9998949 0.9999274 0.9999241
## [407] 0.9999152 0.9999057 0.9999022 0.9999017 0.9999081 0.9998896 0.9998869
## [414] 0.9998498 0.9998380 0.9998560 0.9998586 0.9998198 0.9998534 0.9998455
## [421] 0.9998293 0.9998340 0.9998473 0.9998282 0.9998322 0.9998364 0.9998439
## [428] 0.9998265 0.9998608 0.9998082 0.9998535 0.9998294 0.9998323 0.9998372
## [435] 0.9998556 0.9998714 0.9998768 0.9998650 0.9998713 0.9998924 0.9998795
## [442] 0.9998821 0.9999161 0.9999129 0.9999303 0.9999261 0.9999180 0.9999414
## [449] 0.9999500 0.9999438 0.9999550 0.9999608 0.9999599 0.9999827 0.9999795
## [456] 0.9999849 0.9999818 0.9999795 0.9999805 0.9999837 0.9999878 0.9999862
## [463] 0.9999883 0.9999881 0.9999884 0.9999891 0.9999898 0.9999903 0.9999908
## [470] 0.9999906 0.9999898 0.9999892 0.9999907 0.9999968 0.9999931 0.9999934
## [477] 0.9999928 0.9999922 0.9999930 0.9999915 0.9999912 0.9999905 0.9999910
## [484] 0.9999896 0.9999879 0.9999887 0.9999890 0.9999890 0.9999868 0.9999893
## [491] 0.9999880 0.9999877 0.9999867 0.9999851 0.9999855 0.9999841 0.9999843
## [498] 0.9999823 0.9999793 0.9999825 0.9999822 0.9999810 0.9999765 0.9999797
## [505] 0.9999766 0.9999738 0.9999758 0.9999745 0.9999766 0.9999729 0.9999767
## [512] 0.9999722 0.9999712 0.9999714 0.9999742 0.9999724 0.9999690 0.9999730
## [519] 0.9999725 0.9999689 0.9999746 0.9999724 0.9999719 0.9999704 0.9999726
## [526] 0.9999721 0.9999696 0.9999732 0.9999745 0.9999722 0.9999692 0.9999755
## [533] 0.9999743 0.9999702 0.9999759 0.9999772 0.9999759 0.9999736 0.9999775
## [540] 0.9999763 0.9999712 0.9999795 0.9999791 0.9999787 0.9999763 0.9999821
## [547] 0.9999809 0.9999783 0.9999811 0.9999821 0.9999800 0.9999796
```

```r
pcauchy(df$Deceased, location = 0, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##  [1] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [8] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [15] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [22] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [29] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [36] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [43] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [50] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [57] 0.5000000 0.5000000 0.7500000 0.5000000 0.5000000 0.7500000 0.5000000
## [64] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
```

```
##  [71] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [78] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [85] 0.5000000 0.7500000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [92] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
##  [99] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [106] 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000 0.5000000
## [113] 0.5000000 0.7500000 0.5000000 0.7500000 0.7500000 0.5000000 0.5000000
## [120] 0.7500000 0.7500000 0.7500000 0.7500000 0.5000000 0.7500000 0.5000000
## [127] 0.8975836 0.5000000 0.7500000 0.5000000 0.7500000 0.5000000 0.7500000
## [134] 0.7500000 0.7500000 0.5000000 0.5000000 0.7500000 0.5000000 0.5000000
## [141] 0.7500000 0.5000000 0.5000000 0.5000000 0.5000000 0.7500000 0.5000000
## [148] 0.5000000 0.5000000 0.5000000 0.5000000 0.7500000 0.7500000 0.7500000
## [155] 0.5000000 0.5000000 0.5000000 0.5000000 0.8524164 0.5000000 0.5000000
## [162] 0.5000000 0.5000000 0.8524164 0.8524164 0.8524164 0.7500000 0.7500000
## [169] 0.8524164 0.7500000 0.8524164 0.8524164 0.7500000 0.7500000 0.7500000
## [176] 0.9371670 0.9220209 0.9371670 0.8524164 0.8524164 0.9220209 0.7500000
## [183] 0.8524164 0.8975836 0.9604166 0.7500000 0.8524164 0.8975836 0.9548328
## [190] 0.8975836 0.9371670 0.9220209 0.8524164 0.9548328 0.9371670 0.9474315
## [197] 0.8975836 0.9682745 0.9548328 0.9682745 0.9755627 0.9474315 0.9548328
## [204] 0.9647767 0.9735353 0.9788107 0.9371670 0.9711421 0.9682745 0.9755627
## [211] 0.9682745 0.9548328 0.9474315 0.9548328 0.9548328 0.9220209 0.9548328
## [218] 0.9682745 0.9711421 0.9711421 0.9682745 0.9735353 0.9755627 0.9735353
## [225] 0.9735353 0.9773021 0.9788107 0.9773021 0.9788107 0.9735353 0.9773021
## [232] 0.9647767 0.9735353 0.9823343 0.9801315 0.9823343 0.9832623 0.9840977
## [239] 0.9848538 0.9855413 0.9848538 0.9848538 0.9840977 0.9855413 0.9861692
## [246] 0.9890281 0.9840977 0.9855413 0.9861692 0.9861692 0.9872744 0.9855413
## [253] 0.9867448 0.9872744 0.9861692 0.9872744 0.9855413 0.9848538 0.9840977
## [260] 0.9861692 0.9867448 0.9877633 0.9855413 0.9848538 0.9867448 0.9877633
## [267] 0.9861692 0.9877633 0.9872744 0.9877633 0.9840977 0.9867448 0.9882161
## [274] 0.9877633 0.9886366 0.9882161 0.9886366 0.9848538 0.9877633 0.9886366
## [281] 0.9877633 0.9882161 0.9886366 0.9867448 0.9855413 0.9886366 0.9890281
## [288] 0.9872744 0.9877633 0.9877633 0.9848538 0.9832623 0.9882161 0.9886366
## [295] 0.9877633 0.9886366 0.9872744 0.9882161 0.9855413 0.9867448 0.9877633
## [302] 0.9882161 0.9861692 0.9872744 0.9882161 0.9848538 0.9877633 0.9886366
## [309] 0.9897355 0.9890281 0.9900561 0.9886366 0.9861692 0.9897355 0.9909079
## [316] 0.9877633 0.9890281 0.9900561 0.9890281 0.9867448 0.9903572 0.9882161
## [323] 0.9882161 0.9861692 0.9890281 0.9893936 0.9882161 0.9882161 0.9855413
## [330] 0.9855413 0.9801315 0.9848538 0.9872744 0.9773021 0.9867448 0.9886366
## [337] 0.9893936 0.9861692 0.9848538 0.9872744 0.9832623 0.9867448 0.9872744
## [344] 0.9872744 0.9861692 0.9855413 0.9861692 0.9840977 0.9872744 0.9877633
## [351] 0.9832623 0.9861692 0.9882161 0.9848538 0.9812974 0.9877633 0.9823343
## [358] 0.9848538 0.9832623 0.9861692 0.9840977 0.9812974 0.9832623 0.9840977
## [365] 0.9832623 0.9855413 0.9823343 0.9848538 0.9812974 0.9801315 0.9840977
## [372] 0.9812974 0.9832623 0.9801315 0.9832623 0.9801315 0.9832623 0.9823343
## [379] 0.9801315 0.9823343 0.9801315 0.9788107 0.9755627 0.9823343 0.9801315
## [386] 0.9773021 0.9788107 0.9755627 0.9788107 0.9801315 0.9773021 0.9812974
## [393] 0.9773021 0.9773021 0.9823343 0.9788107 0.9755627 0.9801315 0.9788107
## [400] 0.9773021 0.9801315 0.9801315 0.9755627 0.9735353 0.9801315 0.9773021
## [407] 0.9755627 0.9773021 0.9735353 0.9788107 0.9711421 0.9788107 0.9755627
## [414] 0.9788107 0.9812974 0.9788107 0.9755627 0.9735353 0.9682745 0.9682745
## [421] 0.9735353 0.9773021 0.9773021 0.9735353 0.9711421 0.9801315 0.9788107
## [428] 0.9711421 0.9773021 0.9735353 0.9682745 0.9735353 0.9773021 0.9801315
## [435] 0.9823343 0.9855413 0.9812974 0.9801315 0.9711421 0.9840977 0.9855413
## [442] 0.9840977 0.9848538 0.9882161 0.9872744 0.9848538 0.9886366 0.9855413
```

```
## [449] 0.9886366 0.9882161 0.9872744 0.9893936 0.9886366 0.9900561 0.9922379
## [456] 0.9933695 0.9935048 0.9933695 0.9935048 0.9929276 0.9944162 0.9945124
## [463] 0.9949479 0.9941060 0.9950268 0.9953193 0.9951033 0.9959710 0.9966495
## [470] 0.9967186 0.9965774 0.9966844 0.9964236 0.9963414 0.9967186 0.9971580
## [477] 0.9975133 0.9977584 0.9981914 0.9983069 0.9983760 0.9982017 0.9978920
## [484] 0.9982414 0.9983592 0.9983924 0.9982887 0.9981707 0.9983592 0.9985056
## [491] 0.9979196 0.9976422 0.9984770 0.9985978 0.9984914 0.9974330 0.9979596
## [498] 0.9983592 0.9981601 0.9981386 0.9984548 0.9980229 0.9980825 0.9978347
## [505] 0.9963830 0.9964634 0.9972322 0.9971580 0.9966139 0.9977425 0.9978780
## [512] 0.9976595 0.9973025 0.9973025 0.9948664 0.9971064 0.9969394 0.9977584
## [519] 0.9974330 0.9978198 0.9976422 0.9958120 0.9968794 0.9977584 0.9978493
## [526] 0.9977584 0.9975515 0.9970798 0.9967186 0.9968170 0.9974330 0.9975133
## [533] 0.9963414 0.9975515 0.9972079 0.9960704 0.9945124 0.9969394 0.9969686
## [540] 0.9973910 0.9975886 0.9967521 0.9951775 0.9976422 0.9979596 0.9975702
## [547] 0.9975133 0.9972560 0.9960213 0.9943165 0.9973025 0.9978493
```

```
qcauchy(df$Confirmed, location = 0, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qcauchy(df$Confirmed, location = 0, scale = 1, lower.tail = TRUE, :
## NaNs produced
```

```
##   [1] -Inf -Inf -Inf  Inf  Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [16] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [31] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  NaN  NaN -Inf  NaN  NaN -Inf
##  [46]  NaN  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [61]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [76]  NaN  Inf  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [91]  NaN  NaN -Inf  NaN -Inf -Inf  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN
## [106]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [121]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [136]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [151]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [166]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [181]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [196]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [211]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [226]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [241]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [256]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [271]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [286]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [301]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [316]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [331]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [346]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [361]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [376]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [391]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [406]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [421]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [436]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [451]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [466]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [481]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [496]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
```

```
## [511]    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN
## [526]    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN
## [541]    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN
```

```r
rcauchy(df$Confirmed, location=1, scale=1)
```

```
##   [1]   1.331037e+00 -9.885447e+00 -1.943474e+01  1.156915e+00  1.407550e+00
##   [6]   4.447383e+00 -7.184028e-01  3.232462e+00  1.203460e+00  2.041030e-01
##  [11]   4.238446e-01  8.903379e-01  1.221050e+00 -1.498421e+00  4.941429e-01
##  [16]   2.123079e+00  2.808080e+00  2.717190e+00  2.452808e+01  9.727535e-01
##  [21]   6.931305e+00 -1.039447e-01  3.493847e+00 -3.523118e+00 -5.740980e-01
##  [26]   2.248132e+00  7.995011e-01  6.885119e-01  1.245268e+00  1.679567e+00
##  [31]   1.597002e+00 -6.381611e-02  1.532418e+00  1.050464e-01  2.418949e+00
##  [36]  -4.751723e+00  1.421000e+00  3.497950e+00  4.663697e-02  1.628635e+00
##  [41]   4.148064e-02  2.388041e+00 -9.252021e-01  3.506914e+00  2.521825e+00
##  [46]   3.701887e+00  6.739821e+00  1.685624e+00  8.937979e-01  2.732455e+00
##  [51]   9.327710e-01  1.115910e-01  6.171725e-02  9.210206e-01  8.543380e+00
##  [56]  -6.999832e-02  6.656533e-01  1.306586e+01 -7.172892e+01 -6.991672e-01
##  [61]  -3.286111e-01  1.550358e+00  1.828023e+00  1.727245e+00 -1.605155e+00
##  [66]   8.051046e-01 -1.395173e-01  1.125288e+00  1.770213e+00  2.398538e-01
##  [71]   1.314821e+00  4.299706e-01 -1.072604e+00 -1.874768e+00  5.360263e-01
##  [76]   1.151496e+00  1.442652e+00 -2.924877e+00  1.591860e+01  2.790566e+00
##  [81]   6.464811e-01  9.510119e-01  3.629455e+00 -4.446782e-01  1.913569e-01
##  [86]   4.246163e-01  1.813347e+00  9.051139e-01 -8.367195e+00 -5.731464e-01
##  [91]   2.285836e+00  8.605959e-01  1.603248e+00 -1.244372e+01 -9.087042e-01
##  [96]   4.801668e-01 -4.714210e+00 -2.395905e+00  2.696362e+00 -5.725614e+00
## [101]   1.164990e+00  8.371767e-01  1.592208e+01  8.211058e-02 -2.569238e+00
## [106]  -1.091092e+00  1.568672e+00 -9.398913e-01 -2.769243e+00  1.975433e+00
## [111]  -3.078156e+00 -9.150916e-01 -3.502119e+00  2.946295e+00  1.082480e+00
## [116]   3.668204e-01  8.927913e-01 -2.627766e+00 -8.412452e+00 -8.349336e-01
## [121]   3.344901e-01  1.234357e+00  2.140660e+00  1.421648e+01  9.609573e-01
## [126]   2.672739e+00  1.501472e+00  2.211913e+00  1.101426e+00  6.855663e-01
## [131]   2.115398e+00 -9.685683e+00 -1.491570e+00  2.836466e+00  1.319754e+00
## [136]  -2.891028e-01  2.322618e+00  9.599690e-01 -3.213918e-04  1.482835e+00
## [141]   1.412157e+00 -6.100637e-01 -6.474316e+01  1.051386e+00 -3.857950e+00
## [146]   1.492590e+00  1.982731e+00  1.849492e+00  3.853197e+00  1.583333e+01
## [151]   4.637113e+00 -9.669751e+00  1.670588e+00  7.385767e-01  2.317944e+00
## [156]   5.586631e-01  1.830703e+00  8.557151e-01  3.950516e+00  1.935732e+00
## [161]   1.081327e+00  4.746794e-01  2.488944e-01  2.148997e+00  5.021928e-01
## [166]   1.085497e-01  3.204127e+00  1.194822e+00  1.635570e+00  4.069867e+00
## [171]   1.661758e+00  2.420597e+00  2.378823e-01 -3.250791e+00 -6.811757e-02
## [176]  -6.889424e+00  2.161746e+00  1.514683e+00  9.910570e-01  3.808500e-01
## [181]   2.265206e+00  4.901219e+00 -3.731739e+00  1.086730e+00  1.448876e-02
## [186]  -6.217508e+00  3.516134e+00  7.690844e-01 -2.063452e+00 -1.205307e-01
## [191]  -1.102158e+00  2.021052e+00  3.524214e+03 -7.515911e-02  1.464957e+00
## [196]  -8.886049e+00  1.775566e+00  9.083951e-01 -3.816352e+00 -4.879107e-01
## [201]   2.222937e+00 -4.628736e+00  3.037296e+00  1.012471e+00  7.006730e-01
## [206]   6.470944e-01  1.007657e+00  2.902180e+00  1.097049e+00  3.372191e+00
## [211]   1.138233e+00  6.929656e+00 -1.228824e+00  2.831299e+00  2.947691e+00
## [216]   9.394931e-01  1.248625e+00  2.513940e+00  2.692075e+00 -1.053463e-01
## [221]  -1.031590e+02  2.068408e+00  4.354868e+00 -2.483306e-01 -1.938081e+00
## [226]   1.142411e+00 -5.765033e-01  1.584444e+01  1.483463e+00  1.143722e+00
## [231]  -1.116465e-01  1.823386e+00 -1.048291e-01  1.455026e+00  2.674121e+00
## [236]  -1.850402e+00 -2.472876e+00  6.203658e+00  7.895030e-01 -8.796532e-02
## [241]   2.277640e+00 -4.869359e+01  9.389365e-01  3.080203e+00 -2.558629e-01
```

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```
## [246]  1.227055e-01  1.179264e+00  4.174959e-01  6.890980e+00  1.856916e+01
## [251] -8.463432e-01  3.124856e+00  3.266307e+00 -1.168628e-01  1.065205e+00
## [256]  1.292729e+00  1.257097e+00  4.452006e-01  7.912364e-01  1.324518e+00
## [261]  1.235145e+00 -4.466066e+00  1.002180e+00  2.917405e+00  3.745032e+00
## [266]  5.938675e-02  3.180537e+00  4.953159e+00  8.689807e-01  2.121632e+00
## [271]  1.448380e+00  1.214726e+00  9.243448e-02 -4.469263e-01  1.975456e+00
## [276]  2.245669e+00  2.079639e+00  2.683409e-01  3.795733e-01  2.078495e+00
## [281]  1.050486e+00  1.292231e+00  9.913985e-01  2.837376e-01  1.645352e+00
## [286]  1.289398e+00  6.093555e-01  1.388737e+00  1.147770e+00 -1.412745e+00
## [291]  9.328452e-01 -1.397314e+00  1.658978e+00  2.986800e+00  1.916327e+00
## [296] -1.393552e-01  2.842309e+00  8.254388e+01  5.540185e-01 -6.338114e-02
## [301] -4.674158e+00  3.178123e+00  1.050956e+00  3.244445e+00 -7.345823e-01
## [306]  4.826268e+00  2.288959e+00  6.733572e+00  6.981904e-01 -3.815079e-01
## [311]  1.739573e+00  7.161858e-01  5.133118e+00  1.282424e+00  1.019853e+00
## [316]  9.052842e-02  1.796727e+00  2.420097e+00  5.507962e-01  1.894415e+00
## [321]  2.686963e+00  1.772371e+00  3.638422e+00  1.998437e+00 -2.988923e-01
## [326]  1.080082e+00  4.940565e-01  3.564098e+00  9.487845e-01 -2.596291e-01
## [331]  1.190650e+00  1.090108e+00 -6.046551e+00 -8.265433e-01  1.338910e+00
## [336] -4.704062e-01  9.687197e-01  9.472874e-02  2.502090e-01  4.491258e-01
## [341] -2.682220e+00  9.120302e-01  3.166207e+00  5.248852e-01  3.435836e+00
## [346]  4.733544e+00 -2.271933e-01  1.676749e+00  1.638769e+00  6.294722e-01
## [351]  1.979775e+00  9.932462e-01  7.507416e-01  2.291135e+00 -1.716626e+00
## [356]  3.225462e+00 -5.660388e+01  3.617879e+00 -8.349006e-01  2.432812e+00
## [361]  2.027952e+00  4.441619e-02  6.745612e-01  1.416983e+00 -1.709169e+00
## [366] -1.084455e+01  1.023838e+00  5.236455e-01  2.963432e+00  1.282462e+00
## [371]  3.269375e+00  9.488409e-01  1.770099e+00  9.481061e-01 -5.852517e-01
## [376] -1.229752e+00 -3.382649e+00 -2.963477e-01  1.248701e+00  3.990182e-01
## [381]  8.708147e-01  1.193412e+00 -9.535469e-01  1.839507e+00  1.738591e+00
## [386]  1.375766e+00 -8.846193e-01 -8.471949e-01 -1.677557e+00  2.263022e+00
## [391]  1.346110e+00  1.115624e+00  1.418232e+00  2.190681e+00 -5.402983e-01
## [396]  4.458217e+00  3.298844e+00  1.868520e+00 -1.303304e+00 -1.440537e+00
## [401] -4.478468e+01  2.740762e+00  1.282706e+00 -1.628919e-01 -9.699699e+00
## [406]  2.165984e+00  1.940029e+00 -2.095351e+00  2.614416e+00  1.216368e-01
## [411]  4.526824e-01  1.904125e+00  1.018944e+00  1.318553e+00 -2.677340e-02
## [416]  5.632592e-02 -8.219336e+00  8.989910e-01  1.986739e+01 -2.332333e+00
## [421]  4.206932e+00  1.118325e+00  3.436362e-01  7.211495e-01  4.341798e-01
## [426] -7.749133e-01  5.314081e+00  9.660865e-01  3.626909e+01  9.574410e+01
## [431]  2.310151e+00  6.084389e-01  3.066557e+00  2.102755e+00  1.795058e+00
## [436]  6.992454e+00  1.110515e-01  8.120332e-01 -2.273391e+00  8.036656e+00
## [441]  1.456558e+00  1.589304e+00 -2.366165e+00  2.026739e+00  1.051481e+00
## [446]  1.493600e+00  1.081444e+00  6.087956e+00 -5.114671e-01  2.838815e-01
## [451]  1.622121e+00 -3.245801e+01  1.495520e+00  4.654718e+00  1.027500e+00
## [456]  1.470952e+00  1.106893e+00 -7.440074e-02 -2.728310e+00  1.530356e+00
## [461] -1.039602e+00  3.979598e+00  1.879224e+00  8.079662e-01  1.454637e+00
## [466]  1.497015e-01  1.033503e+00 -4.386953e-01  1.676886e+00  3.248970e+00
## [471]  2.721021e+00 -1.907554e-01  3.301763e+00  1.479667e+00  3.270050e-01
## [476] -8.689992e-01  1.496317e+00 -1.976270e-02  1.524920e+00  5.052119e-01
## [481]  1.009857e+00  8.916915e-01  3.834400e+00  1.015775e+01  9.909829e-01
## [486]  2.241249e+00  2.485211e+01 -3.561239e+00  6.189917e+00  6.611330e-01
## [491]  1.082728e+00  4.576928e+00  2.329431e+00 -9.037664e-01  8.082463e-01
## [496]  8.307374e+01  2.970558e+00  7.589284e-01  6.818382e-01  7.940416e-02
## [501]  1.434770e+00 -4.139073e-01  4.149702e-01  1.667816e+00  3.737572e+00
## [506] -2.806737e-01  5.721442e-01  1.649875e+00  2.136068e+00  1.682412e+00
## [511]  2.043119e+00  1.882396e+00  3.037055e+00  4.127189e+00  1.235453e+00
```

```
## [516]   2.701333e+00   6.413873e-01   2.837399e+00   4.067946e+00   2.238942e+00
## [521]   1.397041e+00   1.573172e+00   2.021618e+00   1.382676e+00   4.849626e-01
## [526]   5.829345e-01   1.397542e+00   3.488807e+00   1.751236e+00   1.099922e+00
## [531]  -6.523052e-01  -2.919960e+00   2.556873e+00   1.125144e+01   1.159183e+00
## [536]   7.814034e-01   5.015271e-01  -2.191310e-01   1.619386e+00  -3.606347e-01
## [541]   2.309291e+01   2.834371e+00  -4.084021e-01  -6.338470e+00   2.243354e+00
## [546]   3.423926e+00   3.311417e+00   1.398898e+00  -7.925095e+00   6.397904e-01
## [551]  -7.344047e-01  -6.365680e+00
```

```r
rcauchy(df$Recovered,location=1,scale=1)
```

```
##    [1]   1.042711e+00   3.027016e-01   2.222087e+00   1.210937e-01   1.775021e+00
##    [6]  -3.642558e-01  -4.724059e+01   1.237305e+00   2.709752e+00  -8.510420e+00
##   [11]   2.448221e+01   1.763038e+00  -1.558913e+00   3.463909e-01   1.208743e+00
##   [16]   3.754895e+00   5.615478e+00   1.743948e+00   1.057939e+01   2.231404e+00
##   [21]   6.373901e-01   5.669605e-01   4.148345e-01   8.733184e-01  -5.945603e+00
##   [26]  -1.916699e+00   4.462944e-01   4.581642e-01  -2.917808e+00   1.139267e+00
##   [31]   1.416671e+00   2.006542e+00   1.408516e+00   1.081093e+00   6.707048e-01
##   [36]   1.380502e+00   1.576466e+00   1.000483e+00   6.749559e-01   1.876188e+00
##   [41]   3.891946e+00   1.429459e+00  -1.141752e+01   6.022193e-01   8.727270e-01
##   [46]   2.181041e+00   2.549029e+00  -3.784342e+01   8.878772e-01   1.243836e+00
##   [51]   1.192558e+00   1.488069e+00   9.642582e+00  -1.087394e+01   1.274344e+00
##   [56]   9.315546e+00   1.238258e+00   4.550829e+00   2.904845e+00   3.499318e+00
##   [61]   1.058923e+01   8.205384e-01   4.804138e+00  -2.533334e+01  -1.076694e+00
##   [66]   5.403216e+00   8.831850e-01   1.157260e+00   8.736427e-01   3.597456e-01
##   [71]   2.184406e+00  -1.201991e+00   2.253949e+00   2.293397e+00   2.600660e+00
##   [76]   1.346071e+00  -2.121292e+00  -6.017510e-01   4.306972e+00   2.863351e+00
##   [81]   4.051083e-01   2.811184e+00   8.388595e+00   1.545143e+01  -2.701495e+01
##   [86]   7.736785e-01   2.054702e+01  -1.807212e+00   4.328649e+00   1.239774e+00
##   [91]   4.700391e-01   1.498899e+00   6.393690e-01   1.596079e+00   1.394362e+00
##   [96]   4.481765e-01   2.746492e+00   1.041731e+00  -3.739466e+00   9.592039e-01
##  [101]   1.315476e-01   2.526420e+00   2.309979e+00   7.375659e-01  -9.980717e-01
##  [106]  -5.068649e+00   2.023674e+00   4.443858e-01  -3.628270e-01   3.822515e+00
##  [111]  -2.666516e+00  -1.527323e+01  -1.673353e+00  -3.459184e+00   2.096378e+01
##  [116]   1.282313e-01   2.562393e-02   8.130984e+00   1.257137e+00   4.712261e-01
##  [121]   2.165075e+00   8.246085e-01   1.266315e+00   7.967804e-01  -1.493181e+00
##  [126]   3.291390e+00   1.015393e+00   1.409985e+00   1.600262e+00  -9.739960e-01
##  [131]  -4.045994e+00  -3.463787e-01   5.987361e-01   6.673205e-01   5.006917e+00
##  [136]   1.277794e+01   1.469223e+00   6.187443e+00   8.719499e-01  -7.145816e-01
##  [141]   9.836071e-01   2.215902e+00   1.496670e+00   1.769969e+00  -2.330867e+00
##  [146]  -2.454599e+01   1.656696e+00   9.578934e-01   1.895445e+00  -1.818346e+00
##  [151]   1.321312e+00   1.195346e+00   1.258527e+00   1.958894e+00   1.355934e+00
##  [156]   9.034914e-01   3.690637e+01   2.340521e+00   2.201377e+00   4.683548e+00
##  [161]   7.344609e-01  -2.620448e+00   1.854906e+00  -1.778550e-02   1.033894e+00
##  [166]  -7.214776e-01   1.104346e+00   7.114322e-01  -3.381546e+00   3.386336e+00
##  [171]   1.089675e+00   4.682753e+00  -2.158172e-01   9.216280e-01   1.062461e+00
##  [176]   3.390896e+00   4.313414e-01   1.792925e+00  -3.210825e+00   2.033133e+00
##  [181]   4.700278e+00   1.367694e+00   1.487696e+00  -3.904634e-02  -1.051393e+00
##  [186]  -8.823472e-01   1.376122e+00   1.790783e+00  -2.911851e-01  -2.092191e-02
##  [191]  -4.746883e+00   1.448621e+00   1.385498e+00   1.477522e+01   2.414048e+00
##  [196]  -1.598735e-01  -8.654611e-01   2.459647e-01   2.614655e+00   5.254441e-03
##  [201]   3.518471e-01  -2.354664e+00  -3.410944e+00   2.538224e+00   1.770891e+00
##  [206]   1.094202e+00   1.061096e-01   2.016873e+01   9.549240e-01   1.416473e-04
##  [211]   7.088245e-01   3.297537e+00   2.077444e+00   2.389407e+00   1.730616e-01
##  [216]   3.271476e+00   1.704023e+00  -1.895261e+00   1.569994e+00  -5.054782e+00
```

```
## [221]   3.908397e+00   2.243404e+00  -3.305217e+01  -4.054825e+02   3.753795e-02
## [226]  -1.131493e+00  -1.717254e+00  -4.579299e-01   1.539842e+00   3.567609e-01
## [231]   4.891336e+00   2.989690e-01   1.512435e+00   7.840555e-01   7.103363e-01
## [236]  -1.469572e+01  -5.261998e+00   2.188894e+00  -1.126366e+01   1.043421e+01
## [241]   1.791711e-01  -2.818764e+01   6.329138e-01   9.201742e-01   4.036689e-01
## [246]   5.339957e-01   9.360124e-01  -1.991999e-02  -1.424934e+00  -1.859596e+01
## [251]  -2.953826e-01   9.552836e-01   1.432507e+00   2.032926e+00   1.428394e+00
## [256]   2.580868e+00  -8.387795e-01  -1.932409e+00   1.764667e+00   1.322713e+00
## [261]   1.926486e+00   2.817385e+00  -6.644969e-01   5.582884e+01  -2.345108e-01
## [266]  -1.860844e+00  -1.139298e+00   1.870372e+00   4.053160e+00   1.657781e+00
## [271]  -2.066037e-01   2.356779e+00  -1.699777e+00  -7.020381e-01   1.654757e+00
## [276]   9.820626e-01   1.552422e+01   2.097526e+00   1.094617e+00   2.068403e+00
## [281]  -6.001222e+00   1.940984e+00  -5.682640e+00   1.109840e+00   1.095066e+00
## [286]   2.070705e+00  -4.256805e+00   1.276094e+00   6.390140e-02   7.454811e-01
## [291]   1.804736e+00   1.444364e+00   1.047950e+00   2.835768e+00   2.257628e+00
## [296]   3.154531e+00  -3.179402e+00   5.095758e+00  -1.165912e+00   5.173170e-01
## [301]   1.285983e+00  -5.473849e+00  -1.252276e+00  -1.418457e+00   1.333064e+00
## [306]   5.044197e-01   3.065918e+00   9.847248e-01   2.002664e+00   3.204171e+00
## [311]   8.401867e-01  -4.995534e+00   1.939142e+00   3.703743e-01   7.190941e-01
## [316]  -6.628337e-01  -5.478185e-01   2.331794e-01   4.469828e+00   1.480591e+00
## [321]   1.070884e+00  -1.270160e+01   1.512830e+00   2.330117e+00   4.234140e-01
## [326]   1.208791e+00   1.035279e+01  -1.530887e+00   2.678099e+00   1.900237e+00
## [331]   1.715577e+00   1.897502e-01   1.418286e+00   5.016906e-01  -4.848610e+00
## [336]  -6.949085e+00  -1.238889e+00  -8.526110e-01  -6.386480e+00   4.619683e+00
## [341]   1.079124e+00   3.562579e-01   7.681619e-01   3.807359e+00   9.539773e-01
## [346]   1.267343e+00   2.888177e+00   1.308437e+00   8.774343e-01   6.911092e-01
## [351]   4.383609e+00  -3.752908e+01  -1.752134e+00   6.991009e-01   1.436530e-01
## [356]   5.928235e-01   9.643626e+00   1.179168e+00   2.170512e+00   1.924320e+00
## [361]  -4.094652e+00  -1.038500e+00   1.128265e+00  -2.803725e-01   1.317493e+00
## [366]  -6.515864e-01  -8.208484e-01   1.884315e+00   1.518510e+00   1.443033e+00
## [371]   1.218248e+00   1.931431e+00   1.791817e+00   1.445637e+00   4.019160e+00
## [376]   1.903019e+00   5.808364e+00   1.202197e-01   1.533720e+00  -6.282112e+00
## [381]   5.576652e+00  -4.754256e+00   1.183249e+00   7.171799e+00   1.187468e+00
## [386]   9.510923e-01   1.361850e+00   9.607869e-01  -1.323513e+01   1.140456e+00
## [391]  -1.439440e+00   2.049868e-01   1.285849e+01   1.197119e+01   7.740827e-01
## [396]   1.932340e+00  -2.389886e+01   1.883054e+00   5.123146e+01  -3.892700e+01
## [401]  -1.218657e+00   3.951480e+00   1.257235e+00   1.548114e+00   7.881099e+01
## [406]   3.365139e+00   1.408528e+01   2.884246e-01   8.594129e-02   5.548273e-01
## [411]   1.370349e+00   4.504573e+00   1.984132e+00   3.896914e-01   4.267823e+00
## [416]   1.202332e+00   3.752539e+00   7.404826e-01   1.712852e+00   3.637132e+01
## [421]  -8.278277e+00   2.397319e-01  -2.036167e-01  -1.982767e+00  -2.035419e+00
## [426]  -4.878390e-01   1.482524e+00   1.305881e+00  -1.264645e+00   1.364146e+00
## [431]   7.305387e-01   3.676528e-01   3.824945e+01  -1.024599e+01  -3.282636e-01
## [436]   1.305604e+00  -1.372614e-01   2.234846e-01   3.576348e+00   9.545860e-01
## [441]  -7.997645e-01  -5.018006e+00   3.973871e+00   1.024589e+01  -6.928581e-01
## [446]   8.068557e-01   1.621954e-01  -9.338782e-01   9.377810e-01   1.147757e+00
## [451]  -5.397754e-01   4.580338e-01   9.937800e-01   6.580816e-01   1.176637e+00
## [456]  -2.606132e-01  -1.636561e+00   9.618847e+00   1.885259e+00   5.034641e+00
## [461]  -3.110255e+00   1.381832e-01  -1.778482e-01   7.685627e-01   2.005359e-01
## [466]   1.386318e-01  -3.380341e-01   8.757055e-01   8.696180e-01   7.689494e-01
## [471]   2.122078e-01   1.949232e+00   5.704422e-01   2.047552e-01  -3.157046e+01
## [476]   8.901745e-01  -1.221466e+00  -2.160384e-02   5.251166e-01   1.753285e+01
## [481]   1.761607e+00   2.758400e+00   1.212872e+00  -3.444414e-01   2.468918e+00
## [486]   2.190565e+00   3.039892e-01   1.646110e+01   9.684743e-01   5.221992e+00
```

```
## [491]   2.518529e+00   3.422702e+00   3.157133e+00  -4.659955e+00   9.320891e-01
## [496]   3.651736e+00   2.529118e+00  -1.375945e+00   2.733854e+00   3.835257e+00
## [501]   1.032103e+00   2.117349e-01   2.519148e+00  -1.666006e-01   9.235566e-01
## [506]  -1.416521e-02   2.356835e+00  -3.372722e+00   1.385238e+00   9.578578e+00
## [511]   2.940103e+00   1.481718e+00  -1.265128e+00  -3.226637e-01   1.586210e+00
## [516]   2.335888e+00   9.035184e-01   3.720023e+00   2.400446e+00   2.708920e+00
## [521]   1.698673e+00   5.569147e+00   7.847003e-02   2.216899e+00   2.356392e+00
## [526]   2.258924e+00  -5.665307e-01   2.429997e+00   1.032632e-01  -7.372415e-03
## [531]   5.400275e-01   1.422281e+00   8.988909e-01   1.044796e+00   1.008864e+00
## [536]   5.229207e+00   5.256364e+00  -2.199598e+00  -1.522440e+00   2.010055e+00
## [541]   1.187446e+00  -8.444248e+00   1.512669e+00  -9.261906e+00  -9.684635e+00
## [546]   1.319745e+00  -4.108445e+00   1.124870e+01   1.774980e+00   4.127977e-02
## [551]  -1.974518e+00   1.384149e+00
```

```
rcauchy(df$Deceased,location=1,scale=1)
```

```
##   [1]   -9.92493905    11.30566891     1.30606587    -0.00179964   -28.42187532
##   [6]    0.63565094     1.40864537    -3.00741458    10.93425393     1.90582344
##  [11]   -4.22495802     1.18661350     1.00606180     1.00782523     0.42588281
##  [16]    2.39370222    -1.49480138    -0.03345191     1.12577193    -2.46457727
##  [21]    0.98680295    -0.62004507    -1.14707661    -0.19770613     4.94923661
##  [26]    3.14214890     1.58538817     1.36016891     2.71765862    -0.42060875
##  [31]   -0.94891242     0.69904244     3.89311658     2.38576707    -1.69625778
##  [36]    0.67589290     1.06105420     5.86736089    12.46357799     4.45291476
##  [41]   -0.17812637     1.51675123     0.77225543    -2.78562851     3.79258983
##  [46]    0.02003211   -27.66064077     0.82814708     0.13731072     0.76584726
##  [51]    1.58205539     0.63225021    -0.15512856     3.38021625    -1.87783317
##  [56]   -0.75961370     2.10377870     0.17298446     2.24899288     1.56184402
##  [61]    0.52443589     1.66996417     1.27955842    -0.37211522    -0.39058468
##  [66]    1.10683613     0.15230145     0.71821838     0.31337532     1.64232025
##  [71]   -2.60192965    -1.78291804     0.20516718    -0.54638018     1.54087873
##  [76]   -0.20990766     0.77092435     0.43695266    -0.09835594     2.05936249
##  [81]   -2.44725099     0.74306198     0.96463278    -0.96464112     4.25527353
##  [86]    2.15215380     0.67997335     0.21341817    -1.94328739     3.76527505
##  [91]    4.36495985     0.47702616     0.57558435     1.46258326     1.99204188
##  [96]    1.40321039     1.22081338    11.24193913    -4.51558762     0.39771274
## [101]    0.67510531     0.06183265     1.20917401     2.28742231     0.27442129
## [106]    1.03114314     1.02918929     0.63658187     4.80728613     3.11041325
## [111]    0.44004616    -1.11124400     1.17583614    -0.22585595     1.46598223
## [116]    0.99577923    -0.64330793     1.84392662     9.86367705     0.96739563
## [121]    2.01928109    -0.64275555    -0.20505063    -1.73882096     7.22769557
## [126]   -2.76115522     9.02647811     2.66930099     1.07240626     2.08932617
## [131]    0.60583452     0.92179024     2.00298819     4.49834123     7.93230946
## [136]   -8.73995675     0.31085310     0.41132685     1.59063363     1.61700752
## [141]    0.68394245     0.75648530     0.61244503     1.94207982    -1.14069127
## [146]   -0.65072653     0.41181518    -1.31365792     1.07382505   -16.59004530
## [151]   -0.78058863  -161.46452237     0.55674155     2.14444259     5.17326206
## [156]    3.91909887     4.20100900     3.58564361     1.30247739    -4.50436885
## [161]    2.86411985    -1.47056939     0.93696610     1.17862628     1.49747152
## [166]   -0.66650780     1.36625285     0.49335866     1.53025660   -12.34917541
## [171]    1.78236995     1.00629380     2.05783965     1.15374052     1.06817981
## [176]   -0.25911493    -0.41010109     1.24059357     2.34704382     0.60328884
## [181]    2.11716970     2.19688690    -1.08351494     1.84221887    -1.75117484
## [186]    4.54969374     1.54301869     0.60332173    -1.45653820     1.50571627
## [191]    0.30648616     2.74202041     1.17942666    -5.44590446     0.77834294
```

```
## [196]    0.44440930   -1.84087776   -0.12262788    1.03358159   -0.74358665
## [201]    2.61678387    2.08257286   -0.30494797    1.09477330    1.87408788
## [206]    1.43943607   -4.21294863    0.72302772    2.07086596    1.08100717
## [211]   -2.00136901    0.71171446    4.32268199    1.75913018    0.07042589
## [216]    2.05253570    0.46303076   -0.65226836    0.86237217    1.14198330
## [221]   -3.31509583    2.15228520    2.03683021    1.21758316   -0.31807546
## [226]    2.09582364   -1.11382765    1.27889920    0.10004233    0.27693304
## [231]    1.30681507    0.45556730    0.67909743    0.15639138    0.24272374
## [236]    8.31795715    4.42169707   14.51478612    0.30103716    1.30228101
## [241]    0.51676083    1.81282719    0.96260913    0.74505290    1.80836554
## [246]   -0.28340710    5.37216007    0.70053166   -0.11769453    0.38646336
## [251]    2.18184993    1.66272078   -0.58175460    2.45155808    0.64660039
## [256]    0.49367917   -3.57736386    1.13469856   -1.04777552    1.66512476
## [261]    2.20856691    3.55020027    3.01311603    1.59687983    0.55706827
## [266]    1.68327539   -0.01005331   -4.24778543    0.83648730    0.60465816
## [271]    0.94374517    0.06000641   -5.89262391    0.65298053    1.43382430
## [276]   -0.04416450   -3.81744424    2.25807323   -0.19034327    0.91189409
## [281]    0.52865486    1.76736074    2.76153322    6.83126835    1.24509708
## [286]   -2.69519587    0.31550972    0.44854770  -24.66174164    5.93734018
## [291]   -1.41276899    1.36364713    6.22273908   -1.26536800   -4.66853482
## [296]   -0.48873658    0.06519835  -28.75512723    1.22114232   61.66074122
## [301]    2.98650794   -2.05285649    0.27901868    0.26994026   -0.10157783
## [306]   -1.87903478    3.35855868   -0.72715645    4.27171229    0.50038780
## [311]    1.52010399    7.31400161   -0.19755429    0.32288581    4.24784770
## [316]    0.74802001    1.27777164    0.77822980    2.63969502    2.43379894
## [321]    0.33461905    2.39550609    0.93368839   -2.60617472    3.24214308
## [326]    0.22338173   -4.31978340    3.06525737    0.37529207    5.18400125
## [331]    0.82974332    2.47407620    1.39234930   -3.38789363   -1.93594120
## [336]   -0.05414923    1.74653924    1.68096017  -23.73787284    0.21220359
## [341]   -0.69066496   -4.82982687    0.32732753    1.34085424    0.93922490
## [346]   -0.14362495    5.72982630    1.82989467    1.45631419    0.42391840
## [351]    1.15362424    3.68229191    1.69008865    5.65493569    1.18630937
## [356]    1.91468106    3.51437192   -0.37982864    2.37105779    1.51668064
## [361]    2.27830818    4.00585602   -0.65505063    0.22157903    1.13289966
## [366]   -3.24074992    0.99872275   -0.30175995    1.05942766    3.19499349
## [371]    1.81763622   -0.75305887   -4.07267331    0.20953841    1.15032469
## [376]   -1.56290356    0.80590475   -1.02668433   -5.13424790   -6.46067614
## [381]    2.82290413   -1.96166783   -5.42043518    1.95932508    1.26900819
## [386]    0.30554859    1.06948319    1.78928329   -0.76678109    1.36591586
## [391]    1.64834970    0.06362706    0.47784294    0.12869426    0.11567004
## [396]    0.97327667    1.80313093    1.25792941   -1.62848362   -0.15069531
## [401]    1.51564926    3.43351808    0.90949977    1.38697487    2.82582185
## [406]    1.29700171   -1.15494863   -2.02507418   -1.51360071    7.96673830
## [411]    0.19268903    1.89131526    2.55114799    3.43255429    2.21235879
## [416]    0.66889473   -0.12357193    3.74846996  -59.44383349    0.73934371
## [421]    2.10677725  -13.51895561    2.40685484   -0.74781765    4.12488559
## [426]   10.00725171    0.27962225    0.65562820    0.96282974   -2.20413482
## [431]    2.37824510    3.16959152    8.53040316   -0.13031914   -8.79761704
## [436]    2.01640033    1.01853527    1.31692934    7.36496143    1.56597380
## [441]    0.43109597    0.03577924    2.03226655    1.15253046    3.05097496
## [446]    1.64111584    2.12447030   -3.24369751   -6.71644315    1.45924441
## [451]   -0.81938824  -17.42868462    0.90258716    4.03269198    0.40478970
## [456]    0.17018674    5.44041316    1.01991232   15.94962544    1.87503565
## [461]    0.78471026    2.46743167    1.00690891   -0.28253655   -1.61889149
```

```
## [466]    4.67191965    0.40532969    0.67154834    1.94246527    0.77628630
## [471]   -0.04043937    1.71207722   -0.01351905    1.34027662    0.62225266
## [476]   -0.71354950   -1.31878648    2.66607899    1.81828853    1.93486217
## [481]   -1.36636196    1.21576134  -28.46925299    1.88061997    0.45427696
## [486]    3.24139502    0.97246130    0.74971437    7.02112368    0.36332227
## [491]    2.81710053    0.02004706    1.47526753   -0.68828263    1.00101468
## [496]   52.62964832    1.56456908    0.66112299    0.62825366    1.67743361
## [501]    1.03140327    1.57388925    1.48558430    1.76795314    1.01351193
## [506]    7.20751387    0.44882785    0.44795072    4.21938008   -8.03791079
## [511]    1.12750963   -0.80291365    2.17841938   -3.95176891    4.39954682
## [516]    1.53819867   -0.36977862   -0.19399808    0.61995752   -6.92224690
## [521]    0.76595280    1.02778710    1.69195516   -0.88092099    6.92974975
## [526]   -1.32392878    0.85053349    1.20996327    2.87608536    2.06088624
## [531]    1.93191605    0.16088659    1.11748605   -0.82913362    1.68799131
## [536]    1.71028309    1.34233470   -0.05456910    0.49711417    2.70174449
## [541]    2.70879944   -2.91381482    1.16560457   -0.12003141  -48.80322111
## [546]    1.58769826    1.04717677   21.07704701   -4.33503706   -1.75701778
## [551]   -0.76362481    2.14613644
```

```r
dbeta(df$Confirmed, shape1=1, shape2=2, ncp = 1, log = FALSE)
```

```
##    [1] 1.213061 1.213061 1.213061 0.000000 0.000000 1.213061 1.213061 1.213061
##    [9] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [17] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [25] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [33] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 0.000000
##   [41] 0.000000 1.213061 0.000000 0.000000 1.213061 0.000000 0.000000 1.213061
##   [49] 1.213061 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##   [57] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##   [65] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##   [73] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##   [81] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##   [89] 0.000000 0.000000 0.000000 0.000000 1.213061 0.000000 1.213061 1.213061
##   [97] 0.000000 1.213061 1.213061 0.000000 0.000000 0.000000 0.000000 0.000000
##  [105] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [113] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [121] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [129] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [137] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [145] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [153] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [161] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [169] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [177] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [185] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [193] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [201] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [209] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [217] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [225] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [233] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [241] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [249] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [257] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [265] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

```
## [273] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [281] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [289] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [297] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [305] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [313] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [321] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [329] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [337] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [345] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [353] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [361] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [369] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [377] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [385] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [393] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [401] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [409] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [417] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [425] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [433] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [441] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [449] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [457] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [465] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [473] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [481] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [489] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [497] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [505] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [513] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [521] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [529] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [537] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [545] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

```r
dbeta(df$Recovered, shape1=1, shape2=2, ncp = 1, log = FALSE)
```

```
##   [1] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [9] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [17] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [25] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [33] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [41] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [49] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [57] 1.213061 0.000000 0.000000 0.000000 1.213061 0.000000 0.000000 0.000000
##  [65] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [73] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [81] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [89] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [97] 1.213061 0.000000 0.000000 0.000000 0.000000 0.000000 1.213061 1.213061
## [105] 0.000000 0.000000 1.213061 0.000000 1.213061 1.213061 1.213061 0.000000
## [113] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [121] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [129] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

```
## [137] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [145] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [153] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [161] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [169] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [177] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [185] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [193] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [201] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [209] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [217] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [225] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [233] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [241] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [249] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [257] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [265] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [273] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [281] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [289] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [297] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [305] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [313] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [321] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [329] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [337] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [345] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [353] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [361] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [369] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [377] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [385] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [393] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [401] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [409] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [417] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [425] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [433] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [441] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [449] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [457] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [465] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [473] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [481] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [489] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [497] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [505] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [513] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [521] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [529] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [537] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [545] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

```
dbeta(df$Deceased, shape1=1, shape2=2, ncp = 1, log = FALSE)
```

```
##    [1] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##    [9] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [17] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [25] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [33] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [41] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [49] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [57] 1.213061 1.213061 0.000000 1.213061 1.213061 0.000000 1.213061 1.213061
##   [65] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [73] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [81] 1.213061 1.213061 1.213061 1.213061 1.213061 0.000000 1.213061 1.213061
##   [89] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##   [97] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [105] 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061 1.213061
##  [113] 1.213061 0.000000 1.213061 0.000000 0.000000 1.213061 1.213061 0.000000
##  [121] 0.000000 0.000000 0.000000 1.213061 0.000000 1.213061 0.000000 1.213061
##  [129] 0.000000 1.213061 0.000000 1.213061 0.000000 0.000000 0.000000 1.213061
##  [137] 1.213061 0.000000 1.213061 1.213061 0.000000 1.213061 1.213061 1.213061
##  [145] 1.213061 0.000000 1.213061 1.213061 1.213061 1.213061 1.213061 0.000000
##  [153] 0.000000 0.000000 1.213061 1.213061 1.213061 1.213061 0.000000 1.213061
##  [161] 1.213061 1.213061 1.213061 0.000000 0.000000 0.000000 0.000000 0.000000
##  [169] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [177] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [185] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [193] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [201] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [209] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [217] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [225] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [233] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [241] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [249] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [257] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [265] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [273] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [281] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [289] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [297] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [305] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [313] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [321] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [329] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [337] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [345] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [353] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [361] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [369] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [377] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [385] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [393] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [401] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
##  [409] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

```
## [417] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [425] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [433] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [441] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [449] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [457] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [465] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [473] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [481] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [489] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [497] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [505] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [513] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [521] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [529] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [537] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
## [545] 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

```r
pbeta(df$Confirmed, shape1=1, shape2=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 1 1 0 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 0 1 0 0 1 1 1 1 1 1 1 1 1 1 1
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```r
pbeta(df$Recovered, shape1=1, shape2=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 1 0 1 0 0 0
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```r
pbeta(df$Deceased, shape1=1, shape2=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0
##  [75] 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [112] 0 0 1 0 1 1 0 0 1 1 1 1 0 1 0 1 0 1 0 1 0 1 1 1 0 0 1 0 0 1 0 0 1 0 0 0 0
## [149] 0 0 0 1 1 1 0 0 0 0 1 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```r
qbeta(df$Confirmed, shape1=1, shape2=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qbeta(df$Confirmed, shape1 = 1, shape2 = 1, ncp = 1, lower.tail =
## TRUE, : NaNs produced
```

```
##   [1]   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0   1 NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN   1 NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0   1 NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rbeta(df$Confirmed, shape1=1, shape2=1)
```

```
##   [1] 0.246355994 0.110781888 0.217659645 0.719545038 0.346193480 0.589156777
```

```
##    [7] 0.745454463 0.773290738 0.146795321 0.690507735 0.589126618 0.827272034
##   [13] 0.623101273 0.332756996 0.958531969 0.801819676 0.787880529 0.352122456
##   [19] 0.118865005 0.692777810 0.211332585 0.464342124 0.013562551 0.463714829
##   [25] 0.173242044 0.304412988 0.194598662 0.549124880 0.769055674 0.992107466
##   [31] 0.559438870 0.780874087 0.859785395 0.902900286 0.206049426 0.022833675
##   [37] 0.643561855 0.565847626 0.105532577 0.559652166 0.029796319 0.481425025
##   [43] 0.186315979 0.364003119 0.443989318 0.105459276 0.314964033 0.580445806
##   [49] 0.516649795 0.521023000 0.906789946 0.504657058 0.613103986 0.346447688
##   [55] 0.616241611 0.983354789 0.682575954 0.899791877 0.659306234 0.464955610
##   [61] 0.853975839 0.844539306 0.078067606 0.986668467 0.820116701 0.382764018
##   [67] 0.696982510 0.553352691 0.193686323 0.591840442 0.315467621 0.027963760
##   [73] 0.311339621 0.453452059 0.211779861 0.424309650 0.888577339 0.077360067
##   [79] 0.751285512 0.752902867 0.916640245 0.972741807 0.685227511 0.601640540
##   [85] 0.786531521 0.721961073 0.974056352 0.106814326 0.924185045 0.165729870
##   [91] 0.340828749 0.648729840 0.020210025 0.451400833 0.923796220 0.999037520
##   [97] 0.790908006 0.045291529 0.917856270 0.728708834 0.579900403 0.424461427
##  [103] 0.831009975 0.078024780 0.270932218 0.862182736 0.530236925 0.839372955
##  [109] 0.944961645 0.823148720 0.236620127 0.355746103 0.860924920 0.965856402
##  [115] 0.088028296 0.790317435 0.731333727 0.181660791 0.568316041 0.596665091
##  [121] 0.834090054 0.279224902 0.981784411 0.032203912 0.995730543 0.412288242
##  [127] 0.663591528 0.380200041 0.748927287 0.090539632 0.158887193 0.465601969
##  [133] 0.768965915 0.084937924 0.256338803 0.011330441 0.042991663 0.335209081
##  [139] 0.963103716 0.320234398 0.504589951 0.009413137 0.369664884 0.681535507
##  [145] 0.064313222 0.193357006 0.373366083 0.922020747 0.921038465 0.042675673
##  [151] 0.921246691 0.448583741 0.325331181 0.973437710 0.771225118 0.663858053
##  [157] 0.957513295 0.734718796 0.420690144 0.512950945 0.408383631 0.773780708
##  [163] 0.259386380 0.708811660 0.832982203 0.548498091 0.690063279 0.503790285
##  [169] 0.916993348 0.778196541 0.299576157 0.699584959 0.737701040 0.537942173
##  [175] 0.546734814 0.517798310 0.864423324 0.046191925 0.941972427 0.165701647
##  [181] 0.762242874 0.465597488 0.136131658 0.420743595 0.885870905 0.216169008
##  [187] 0.003582825 0.420154478 0.976411396 0.610255292 0.731235762 0.652259538
##  [193] 0.547473798 0.065177568 0.918942530 0.471304096 0.108995229 0.699129224
##  [199] 0.091327094 0.606851227 0.460650546 0.020976685 0.359622016 0.136310400
##  [205] 0.515329964 0.650447701 0.930797890 0.426592972 0.064970060 0.286719863
##  [211] 0.271154695 0.625759832 0.583856679 0.222542164 0.828672944 0.316606928
##  [217] 0.003438537 0.294563323 0.981991338 0.087698732 0.740097234 0.963264746
##  [223] 0.910866123 0.408481749 0.979006902 0.418855387 0.829646533 0.374619428
##  [229] 0.190352476 0.951413315 0.619730952 0.499693586 0.836120464 0.154533064
##  [235] 0.791843259 0.575105394 0.729555643 0.935444247 0.756578813 0.554022356
##  [241] 0.665904128 0.390151607 0.219125462 0.720423333 0.478688784 0.818384575
##  [247] 0.373364135 0.502786195 0.073145482 0.104470304 0.703551901 0.442124540
##  [253] 0.048413247 0.666595609 0.761609651 0.526652199 0.621512755 0.060124433
##  [259] 0.492345572 0.059287365 0.732459069 0.884441840 0.415607851 0.991952528
##  [265] 0.584462850 0.103716960 0.941802693 0.310232328 0.881791663 0.015246101
##  [271] 0.412490566 0.083892680 0.870033458 0.592239136 0.305065712 0.030411886
##  [277] 0.947498708 0.266275059 0.285927201 0.839226544 0.125385368 0.561583895
##  [283] 0.832497555 0.260799729 0.920792363 0.798211087 0.108014733 0.106950365
##  [289] 0.077485952 0.229750494 0.842262412 0.108272143 0.234848583 0.424995316
##  [295] 0.659299027 0.293244557 0.460390888 0.856613811 0.997063962 0.059862244
##  [301] 0.312307106 0.763102716 0.915641735 0.833821813 0.788314840 0.223424352
##  [307] 0.353728455 0.762004479 0.984386498 0.340486407 0.934738347 0.896856974
##  [313] 0.690527973 0.895131473 0.341038098 0.738862475 0.119688232 0.950749565
##  [319] 0.649425134 0.405872122 0.993043701 0.509985823 0.916218258 0.706962123
##  [325] 0.440583342 0.521127383 0.285379556 0.221997731 0.127459024 0.254944707
```

```
## [331] 0.766426207 0.640168503 0.937442834 0.412172557 0.991215181 0.829637546
## [337] 0.973223777 0.485586045 0.562553287 0.180071936 0.104748219 0.396142247
## [343] 0.362325342 0.245056011 0.811532150 0.434056466 0.527038364 0.272542951
## [349] 0.185622382 0.524555369 0.734640113 0.706782243 0.267566839 0.243793587
## [355] 0.712842576 0.392321164 0.459570942 0.820507671 0.840877167 0.596166085
## [361] 0.709079576 0.418201472 0.187879798 0.689126028 0.138621738 0.440648519
## [367] 0.758014167 0.175815859 0.856132208 0.225096725 0.361115688 0.509143720
## [373] 0.058552453 0.156326258 0.676929785 0.688854058 0.581957359 0.890261822
## [379] 0.720834926 0.498138837 0.809036868 0.312419252 0.906659889 0.502784945
## [385] 0.323009339 0.057209832 0.902374150 0.434264681 0.835691027 0.875918222
## [391] 0.244918438 0.302736877 0.619387997 0.466545149 0.830605769 0.419589997
## [397] 0.702885470 0.132810958 0.979150234 0.496348212 0.333637960 0.300813463
## [403] 0.505596278 0.530669329 0.119187759 0.728133809 0.546704217 0.008486065
## [409] 0.214905483 0.213889578 0.077450612 0.682496279 0.103318827 0.844054491
## [415] 0.003625875 0.808089515 0.919043301 0.800903551 0.384373569 0.362198425
## [421] 0.799793052 0.831783486 0.517715380 0.729040205 0.808350360 0.804776638
## [427] 0.779446991 0.639266851 0.658954035 0.930743585 0.347454484 0.616382782
## [433] 0.774866710 0.116872828 0.566121152 0.737949380 0.368825990 0.783459242
## [439] 0.197491087 0.245253716 0.092566355 0.746937147 0.286027389 0.831654697
## [445] 0.158595297 0.343724444 0.089701696 0.278446808 0.684449736 0.805602469
## [451] 0.574284363 0.918549869 0.808055822 0.309778777 0.934238069 0.976227808
## [457] 0.393474692 0.161681887 0.978638807 0.384725004 0.518382353 0.408685066
## [463] 0.074992840 0.191418626 0.431021464 0.281471062 0.306579601 0.662434655
## [469] 0.376223402 0.894795577 0.927714605 0.978334381 0.459518184 0.303447060
## [475] 0.978923184 0.147796811 0.830005321 0.470811635 0.202161709 0.556783210
## [481] 0.994429933 0.144569517 0.204122737 0.033171800 0.217855815 0.367677894
## [487] 0.533953888 0.846290621 0.001613393 0.994856984 0.273166674 0.674467562
## [493] 0.048754242 0.926575521 0.779677249 0.387517562 0.514229753 0.829613088
## [499] 0.756616891 0.896385964 0.683598511 0.801967045 0.485990663 0.166688383
## [505] 0.996199775 0.444864106 0.941393681 0.829951355 0.246461964 0.728260450
## [511] 0.325828774 0.930941305 0.139971632 0.500782300 0.347340540 0.333048472
## [517] 0.707250844 0.202307160 0.413531492 0.254751293 0.139194991 0.734712228
## [523] 0.490111043 0.618154848 0.014570976 0.395278837 0.566449498 0.169700600
## [529] 0.221952309 0.472821677 0.392587685 0.357969841 0.156738630 0.200941916
## [535] 0.962320130 0.166965888 0.799693226 0.053935400 0.162174526 0.455142891
## [541] 0.081655645 0.444626143 0.478472282 0.284705928 0.486642457 0.469781182
## [547] 0.361118633 0.444809752 0.566370668 0.795902645 0.092431297 0.563969547
```

```r
rbeta(df$Recovered,shape1 = 1,shape2 = 1)
```

```
##   [1] 0.6204207318 0.1971374971 0.4179496835 0.9631593537 0.9556995851
##   [6] 0.9957560543 0.7126207366 0.3196210561 0.3406320624 0.7061028332
##  [11] 0.0143747348 0.9597068257 0.0002657347 0.9619267366 0.2763022163
##  [16] 0.5551660138 0.2385986801 0.9195814808 0.4381117283 0.2748287304
##  [21] 0.8773728951 0.0622038974 0.9255598059 0.7338066662 0.8305494357
##  [26] 0.4545385551 0.8218680054 0.0857523645 0.2985767908 0.4719340941
##  [31] 0.8430701129 0.4214301077 0.2660029144 0.9079108457 0.7689373111
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## [541] 0.6019490401 0.6704697360 0.6907068766 0.8204750530 0.2304952131
## [546] 0.8700007768 0.7458049259 0.9739081485 0.8611268583 0.4765386865
## [551] 0.0614963563 0.6119326092
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## [426] 1.514477e-07 1.228062e-07 1.104077e-07 1.374168e-07 1.338707e-07
## [431] 1.100927e-07 1.555879e-07 7.047947e-08 7.047947e-08 4.561605e-08
## [436] 3.371934e-08 2.252955e-08 1.771079e-08 2.667873e-08 1.530513e-08
## [441] 1.121770e-08 1.309005e-08 8.590265e-09 4.515821e-09 2.593201e-09
## [446] 4.643138e-09 2.255292e-09 1.720506e-09 1.186119e-09 1.068125e-09
## [451] 1.213838e-09 1.066475e-09 1.803863e-09 8.024987e-10 7.050767e-10
## [456] 5.799131e-10 6.246439e-10 6.806394e-10 8.462694e-10 1.277559e-09
## [461] 6.249462e-10 4.910989e-10 4.793505e-10 5.843546e-10 4.906778e-10
## [466] 6.743800e-10 1.144038e-09 6.215989e-10 4.561815e-10 5.414430e-10
## [471] 7.181022e-10 8.093398e-10 9.796369e-10 1.887063e-09 8.801976e-10
## [476] 8.052935e-10 9.297189e-10 9.816849e-10 1.063111e-09 1.296530e-09
## [481] 2.721641e-09 9.731394e-10 1.042246e-09 1.480081e-09 1.735340e-09
## [486] 1.563432e-09 2.183991e-09 5.713270e-09 2.213712e-09 2.236062e-09
## [491] 2.431835e-09 3.281795e-09 2.878711e-09 4.015285e-09 9.965883e-09
## [496] 3.566853e-09 3.291930e-09 4.154546e-09 4.266798e-09 4.517780e-09
## [501] 6.441365e-09 1.450684e-08 5.763768e-09 4.908549e-09 5.559449e-09
## [506] 6.696716e-09 5.582707e-09 6.371869e-09 1.557755e-08 5.429787e-09
## [511] 5.286371e-09 5.925226e-09 6.483834e-09 5.886174e-09 7.268481e-09
## [516] 1.329541e-08 4.707783e-09 4.633624e-09 5.220029e-09 5.908582e-09
## [521] 5.571060e-09 5.903700e-09 1.338157e-08 4.184082e-09 3.551778e-09
## [526] 4.557230e-09 4.698762e-09 4.355700e-09 5.788321e-09 1.421440e-08
## [531] 4.089083e-09 3.534990e-09 4.556569e-09 4.571825e-09 3.314801e-09
## [536] 4.437855e-09 8.764135e-09 3.045077e-09 2.828541e-09 5.260832e-09
## [541] 2.816605e-09 2.517082e-09 2.833401e-09 6.439141e-09 1.765109e-09
## [546] 1.776812e-09 1.775524e-09 2.003265e-09 2.032119e-09 2.011779e-09
## [551] 4.420101e-09 1.541979e-09
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##   [21] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [26] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [31] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [36] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [41] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [46] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
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## [351] 4.595324e-08 4.079557e-08 3.442280e-08 4.448482e-08 5.622135e-08
## [356] 4.683456e-08 1.593923e-08 2.227708e-08 2.316845e-08 3.096947e-08
## [361] 3.230056e-08 2.750355e-08 3.088756e-08 3.449160e-08 2.762168e-08
## [366] 2.111575e-08 1.747983e-08 2.632605e-08 3.178238e-08 2.617053e-08
## [371] 2.123507e-08 2.149708e-08 1.952810e-08 2.264640e-08 2.443166e-08
```

```
## [376] 2.434155e-08 2.061652e-08 2.618876e-08 2.667873e-08 3.040288e-08
## [381] 2.538711e-08 3.926259e-08 3.358654e-08 2.921843e-08 3.702040e-08
## [386] 3.205224e-08 3.668558e-08 2.533498e-08 4.578418e-08 3.406835e-08
## [391] 3.715869e-08 2.495756e-08 3.994069e-08 5.038193e-08 3.997505e-08
## [396] 4.603812e-08 7.157895e-08 7.007868e-08 5.319482e-08 5.004306e-08
## [401] 6.530848e-08 6.987957e-08 5.298431e-08 9.414769e-08 4.493220e-08
## [406] 4.918724e-08 6.136741e-08 7.579365e-08 8.153163e-08 8.244062e-08
## [411] 7.207588e-08 1.039213e-07 1.090782e-07 1.925010e-07 2.238565e-07
## [416] 1.768143e-07 1.705862e-07 2.771490e-07 1.832210e-07 2.036856e-07
## [421] 2.485061e-07 2.352072e-07 1.990212e-07 2.517352e-07 2.401929e-07
## [426] 2.282491e-07 2.079028e-07 2.566981e-07 1.652580e-07 3.136740e-07
## [431] 1.830524e-07 2.482398e-07 2.399398e-07 2.261524e-07 1.777779e-07
## [436] 1.411057e-07 1.294523e-07 1.554559e-07 1.412198e-07 9.871996e-08
## [441] 1.238310e-07 1.185680e-07 6.011160e-08 6.473779e-08 4.147758e-08
## [446] 4.663894e-08 5.741581e-08 2.930457e-08 2.130179e-08 2.695267e-08
## [451] 1.730712e-08 1.310295e-08 1.370017e-08 2.549446e-09 3.595435e-09
## [456] 1.938526e-09 2.822402e-09 3.601007e-09 3.254865e-09 2.268715e-09
## [461] 1.264207e-09 1.618995e-09 1.172442e-09 1.215933e-09 1.146623e-09
## [466] 1.005602e-09 8.874324e-10 7.947790e-10 7.220093e-10 7.596002e-10
## [471] 8.812096e-10 9.971498e-10 7.348658e-10 8.704257e-11 4.098055e-10
## [476] 3.687831e-10 4.390720e-10 5.133926e-10 4.193564e-10 6.207330e-10
## [481] 6.655023e-10 7.749614e-10 6.848995e-10 9.267986e-10 1.252492e-09
## [486] 1.094668e-09 1.026856e-09 1.037270e-09 1.486101e-09 9.793731e-10
## [491] 1.224460e-09 1.292522e-09 1.500251e-09 1.882310e-09 1.798764e-09
## [496] 2.156802e-09 2.110584e-09 2.669559e-09 3.666024e-09 2.617517e-09
## [501] 2.710982e-09 3.083390e-09 4.717526e-09 3.511595e-09 4.663624e-09
## [506] 5.858102e-09 5.002347e-09 5.568377e-09 4.675980e-09 6.282015e-09
## [511] 4.616707e-09 6.571188e-09 7.071295e-09 6.985107e-09 5.666185e-09
## [516] 6.502970e-09 8.174390e-09 6.199295e-09 6.463665e-09 8.238358e-09
## [521] 5.518656e-09 6.478222e-09 6.714435e-09 7.478203e-09 6.391610e-09
## [526] 6.634669e-09 7.909154e-09 6.137805e-09 5.530139e-09 6.596471e-09
## [531] 8.098606e-09 5.135080e-09 5.648792e-09 7.553896e-09 4.963003e-09
## [536] 4.437855e-09 4.956241e-09 5.950819e-09 4.328617e-09 4.775206e-09
## [541] 7.057245e-09 3.594508e-09 3.718144e-09 3.887078e-09 4.803012e-09
## [546] 2.740061e-09 3.118306e-09 4.026804e-09 3.038941e-09 2.730521e-09
## [551] 3.409143e-09 3.539968e-09
```

```r
dt(df$Deceased, df=1, ncp=1, log = FALSE)
```

```
##    [1] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##    [6] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [11] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [16] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [21] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [26] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [31] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [36] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [41] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [46] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [51] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [56] 1.930647e-01 1.930647e-01 1.930647e-01 2.635560e-01 1.930647e-01
##   [61] 1.930647e-01 2.635560e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [66] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [71] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##   [76] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
```

```
##  [81] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##  [86] 2.635560e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##  [91] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
##  [96] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
## [101] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
## [106] 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
## [111] 1.930647e-01 1.930647e-01 1.930647e-01 2.635560e-01 1.930647e-01
## [116] 2.635560e-01 2.635560e-01 1.930647e-01 1.930647e-01 2.635560e-01
## [121] 2.635560e-01 2.635560e-01 2.635560e-01 1.930647e-01 2.635560e-01
## [126] 1.930647e-01 7.896827e-02 1.930647e-01 2.635560e-01 1.930647e-01
## [131] 2.635560e-01 1.930647e-01 2.635560e-01 2.635560e-01 2.635560e-01
## [136] 1.930647e-01 1.930647e-01 2.635560e-01 1.930647e-01 1.930647e-01
## [141] 2.635560e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
## [146] 2.635560e-01 1.930647e-01 1.930647e-01 1.930647e-01 1.930647e-01
## [151] 1.930647e-01 2.635560e-01 2.635560e-01 2.635560e-01 1.930647e-01
## [156] 1.930647e-01 1.930647e-01 1.930647e-01 1.437975e-01 1.930647e-01
## [161] 1.930647e-01 1.930647e-01 1.930647e-01 1.437975e-01 1.437975e-01
## [166] 1.437975e-01 2.635560e-01 2.635560e-01 1.437975e-01 2.635560e-01
## [171] 1.437975e-01 1.437975e-01 2.635560e-01 2.635560e-01 2.635560e-01
## [176] 3.212097e-02 4.823121e-02 3.212097e-02 1.437975e-01 1.437975e-01
## [181] 4.823121e-02 2.635560e-01 1.437975e-01 7.896827e-02 1.311691e-02
## [186] 2.635560e-01 1.437975e-01 7.896827e-02 1.698180e-02 7.896827e-02
## [191] 3.212097e-02 4.823121e-02 1.437975e-01 1.698180e-02 3.212097e-02
## [196] 2.280447e-02 7.896827e-02 8.482966e-03 1.698180e-02 8.482966e-03
## [201] 5.057950e-03 2.280447e-02 1.698180e-02 1.042718e-02 5.924659e-03
## [206] 3.809590e-03 3.212097e-02 7.033455e-03 8.482966e-03 5.057950e-03
## [211] 8.482966e-03 1.698180e-02 2.280447e-02 1.698180e-02 1.698180e-02
## [216] 4.823121e-02 1.698180e-02 8.482966e-03 7.033455e-03 7.033455e-03
## [221] 8.482966e-03 5.924659e-03 5.057950e-03 5.924659e-03 5.924659e-03
## [226] 4.367861e-03 3.809590e-03 4.367861e-03 3.809590e-03 5.924659e-03
## [231] 4.367861e-03 1.042718e-02 5.924659e-03 2.652308e-03 3.351659e-03
## [236] 2.652308e-03 2.381882e-03 2.150741e-03 1.951639e-03 1.778925e-03
## [241] 1.951639e-03 1.951639e-03 2.150741e-03 1.778925e-03 1.628137e-03
## [246] 1.025474e-03 2.150741e-03 1.778925e-03 1.628137e-03 1.628137e-03
## [251] 1.378809e-03 1.778925e-03 1.495720e-03 1.378809e-03 1.628137e-03
## [256] 1.378809e-03 1.778925e-03 1.951639e-03 2.150741e-03 1.628137e-03
## [261] 1.495720e-03 1.275077e-03 1.778925e-03 1.951639e-03 1.495720e-03
## [266] 1.275077e-03 1.628137e-03 1.275077e-03 1.378809e-03 1.275077e-03
## [271] 2.150741e-03 1.495720e-03 1.182615e-03 1.275077e-03 1.099851e-03
## [276] 1.182615e-03 1.099851e-03 1.951639e-03 1.275077e-03 1.099851e-03
## [281] 1.275077e-03 1.182615e-03 1.099851e-03 1.495720e-03 1.778925e-03
## [286] 1.099851e-03 1.025474e-03 1.378809e-03 1.275077e-03 1.275077e-03
## [291] 1.951639e-03 2.381882e-03 1.182615e-03 1.099851e-03 1.275077e-03
## [296] 1.099851e-03 1.378809e-03 1.182615e-03 1.778925e-03 1.495720e-03
## [301] 1.275077e-03 1.182615e-03 1.628137e-03 1.378809e-03 1.182615e-03
## [306] 1.951639e-03 1.275077e-03 1.099851e-03 8.976744e-04 1.025474e-03
## [311] 8.425481e-04 1.099851e-03 1.628137e-03 8.976744e-04 7.045143e-04
## [316] 1.275077e-03 1.025474e-03 8.425481e-04 1.025474e-03 1.495720e-03
## [321] 7.923454e-04 1.182615e-03 1.182615e-03 1.628137e-03 1.025474e-03
## [326] 9.583893e-04 1.182615e-03 1.182615e-03 1.778925e-03 1.778925e-03
## [331] 3.351659e-03 1.951639e-03 1.378809e-03 4.367861e-03 1.495720e-03
## [336] 1.099851e-03 9.583893e-04 1.628137e-03 1.951639e-03 1.378809e-03
## [341] 2.381882e-03 1.495720e-03 1.378809e-03 1.378809e-03 1.628137e-03
## [346] 1.778925e-03 1.628137e-03 2.150741e-03 1.378809e-03 1.275077e-03
```

```
## [351] 2.381882e-03 1.628137e-03 1.182615e-03 1.951639e-03 2.971433e-03
## [356] 1.275077e-03 2.652308e-03 1.951639e-03 2.381882e-03 1.628137e-03
## [361] 2.150741e-03 2.971433e-03 2.381882e-03 2.150741e-03 2.381882e-03
## [366] 1.778925e-03 2.652308e-03 1.951639e-03 2.971433e-03 3.351659e-03
## [371] 2.150741e-03 2.971433e-03 2.381882e-03 3.351659e-03 2.381882e-03
## [376] 3.351659e-03 2.381882e-03 2.652308e-03 3.351659e-03 2.652308e-03
## [381] 3.351659e-03 3.809590e-03 5.057950e-03 2.652308e-03 3.351659e-03
## [386] 4.367861e-03 3.809590e-03 5.057950e-03 3.809590e-03 3.351659e-03
## [391] 4.367861e-03 2.971433e-03 4.367861e-03 4.367861e-03 2.652308e-03
## [396] 3.809590e-03 5.057950e-03 3.351659e-03 3.809590e-03 4.367861e-03
## [401] 3.351659e-03 3.351659e-03 5.057950e-03 5.924659e-03 3.351659e-03
## [406] 4.367861e-03 5.057950e-03 4.367861e-03 5.924659e-03 3.809590e-03
## [411] 7.033455e-03 3.809590e-03 5.057950e-03 3.809590e-03 2.971433e-03
## [416] 3.809590e-03 5.057950e-03 5.924659e-03 8.482966e-03 8.482966e-03
## [421] 5.924659e-03 4.367861e-03 4.367861e-03 5.924659e-03 7.033455e-03
## [426] 3.351659e-03 3.809590e-03 7.033455e-03 4.367861e-03 5.924659e-03
## [431] 8.482966e-03 5.924659e-03 4.367861e-03 3.351659e-03 2.652308e-03
## [436] 1.778925e-03 2.971433e-03 3.351659e-03 7.033455e-03 2.150741e-03
## [441] 1.778925e-03 2.150741e-03 1.951639e-03 1.182615e-03 1.378809e-03
## [446] 1.951639e-03 1.099851e-03 1.778925e-03 1.099851e-03 1.182615e-03
## [451] 1.378809e-03 9.583893e-04 1.099851e-03 8.425481e-04 5.136173e-04
## [456] 3.748493e-04 3.597173e-04 3.748493e-04 3.597173e-04 4.264471e-04
## [461] 2.658844e-04 2.568002e-04 2.176744e-04 2.962281e-04 2.109283e-04
## [466] 1.868529e-04 2.044910e-04 1.384553e-04 9.575400e-05 9.184688e-05
## [471] 9.991583e-05 9.376992e-05 1.090967e-04 1.141690e-04 9.184688e-05
## [476] 6.889593e-05 5.275031e-05 4.286251e-05 2.790251e-05 2.445435e-05
## [481] 2.249891e-05 2.758813e-05 3.790575e-05 2.638231e-05 2.296517e-05
## [486] 2.204671e-05 2.498305e-05 2.854759e-05 2.296517e-05 1.905100e-05
## [491] 3.692131e-05 4.742228e-05 1.978717e-05 1.677364e-05 1.941385e-05
## [496] 5.620802e-05 3.551502e-05 2.296517e-05 2.887855e-05 2.955798e-05
## [501] 2.036766e-05 3.334353e-05 3.136527e-05 3.999654e-05 1.115896e-04
## [506] 1.066863e-04 6.534876e-05 6.889593e-05 9.780172e-05 4.347259e-05
## [511] 3.841281e-05 4.672753e-05 6.206862e-05 6.206862e-05 2.247493e-04
## [516] 7.142362e-05 7.990105e-05 4.286251e-05 5.620802e-05 4.054626e-05
## [521] 4.742228e-05 1.495980e-04 8.306457e-05 4.286251e-05 3.945792e-05
## [526] 4.286251e-05 5.113989e-05 7.273995e-05 9.184688e-05 8.641975e-05
## [531] 5.620802e-05 5.275031e-05 1.141690e-04 5.113989e-05 6.650009e-05
## [536] 1.317043e-04 2.568002e-04 7.990105e-05 7.838664e-05 5.806578e-05
## [541] 4.960210e-05 8.998238e-05 1.983439e-04 4.742228e-05 3.551502e-05
## [546] 5.036219e-05 5.275031e-05 6.422707e-05 1.350165e-04 2.754593e-04
## [551] 6.206862e-05 3.945792e-05
```

```r
pt(df$Confirmed, df=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.1586553 0.1586553 0.1586553 0.4220200 0.4220200 0.1586553 0.1586553
##   [8] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [15] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [22] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [29] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [36] 0.1586553 0.1586553 0.1586553 0.1586553 0.8583933 0.8930018 0.1586553
##  [43] 0.6228720 0.7301026 0.1586553 0.6228720 0.7301026 0.1586553 0.1586553
##  [50] 0.4220200 0.9282827 0.9282827 0.9425365 0.9691547 0.9384573 0.9046975
##  [57] 0.9545864 0.9778461 0.8583933 0.9568498 0.9730053 0.8780756 0.9640243
##  [64] 0.9588986 0.9046975 0.9218273 0.8930018 0.9337570 0.8930018 0.9046975
##  [71] 0.9282827 0.8780756 0.9141028 0.6228720 0.7301026 0.8930018 0.4220200
```

```
##  [78] 0.8780756 0.4220200 0.7919315 0.6228720 0.8583933 0.9545864 0.9218273
##  [85] 0.9141028 0.7301026 0.8780756 0.9218273 0.9337570 0.7919315 0.9141028
##  [92] 0.6228720 0.1586553 0.6228720 0.1586553 0.1586553 0.7301026 0.1586553
##  [99] 0.1586553 0.4220200 0.6228720 0.8780756 0.8780756 0.8313197 0.9141028
## [106] 0.9667863 0.9461098 0.9218273 0.9384573 0.9702167 0.9282827 0.9640243
## [113] 0.9640243 0.9794273 0.9860610 0.9836950 0.9823646 0.9871009 0.9783995
## [120] 0.9898319 0.9860610 0.9851000 0.9858325 0.9848387 0.9899501 0.9894600
## [127] 0.9908053 0.9922134 0.9919971 0.9919223 0.9905023 0.9905023 0.9867041
## [134] 0.9895870 0.9889196 0.9898319 0.9839968 0.9894600 0.9890598 0.9884765
## [141] 0.9910897 0.9926752 0.9931943 0.9935013 0.9937367 0.9938700 0.9943136
## [148] 0.9929730 0.9942378 0.9955675 0.9926752 0.9929154 0.9934021 0.9942759
## [155] 0.9945979 0.9959036 0.9963985 0.9961584 0.9955215 0.9968222 0.9971284
## [162] 0.9974503 0.9979222 0.9982288 0.9980130 0.9980749 0.9985784 0.9986126
## [169] 0.9988028 0.9989073 0.9985424 0.9989472 0.9989114 0.9987995 0.9991673
## [176] 0.9991982 0.9990233 0.9992164 0.9990676 0.9987687 0.9992593 0.9990428
## [183] 0.9982918 0.9993402 0.9992344 0.9992606 0.9991015 0.9992019 0.9992767
## [190] 0.9993341 0.9993091 0.9993913 0.9992862 0.9992700 0.9993900 0.9992868
## [197] 0.9994473 0.9994491 0.9994625 0.9994351 0.9994989 0.9995083 0.9996295
## [204] 0.9995608 0.9995641 0.9996020 0.9995470 0.9993041 0.9996361 0.9996509
## [211] 0.9996407 0.9996601 0.9996394 0.9995987 0.9994351 0.9992418 0.9994413
## [218] 0.9994434 0.9996513 0.9996744 0.9997195 0.9994755 0.9997144 0.9997459
## [225] 0.9997419 0.9997107 0.9997004 0.9997246 0.9996597 0.9997311 0.9997743
## [232] 0.9998013 0.9997926 0.9998139 0.9998159 0.9997030 0.9997905 0.9998392
## [239] 0.9998633 0.9998665 0.9998766 0.9998839 0.9998095 0.9998825 0.9999021
## [246] 0.9998937 0.9999066 0.9998897 0.9998989 0.9998286 0.9998902 0.9999185
## [253] 0.9998413 0.9999066 0.9999265 0.9999075 0.9998542 0.9999014 0.9998616
## [260] 0.9998890 0.9998813 0.9999041 0.9998867 0.9998279 0.9998689 0.9998967
## [267] 0.9998845 0.9998984 0.9998953 0.9998737 0.9997984 0.9998416 0.9999017
## [274] 0.9998769 0.9998698 0.9998917 0.9998770 0.9997911 0.9998740 0.9998985
## [281] 0.9998733 0.9998766 0.9998800 0.9998411 0.9997594 0.9998562 0.9998766
## [288] 0.9998439 0.9998511 0.9998640 0.9998113 0.9996810 0.9998508 0.9998653
## [295] 0.9998489 0.9998566 0.9998502 0.9998355 0.9997699 0.9998405 0.9998668
## [302] 0.9998393 0.9997821 0.9998617 0.9998468 0.9997444 0.9998392 0.9998631
## [309] 0.9998392 0.9998488 0.9998522 0.9998191 0.9997358 0.9998282 0.9998227
## [316] 0.9998066 0.9998138 0.9998547 0.9998160 0.9996807 0.9998344 0.9998602
## [323] 0.9998260 0.9998416 0.9998626 0.9998486 0.9997475 0.9998571 0.9998599
## [330] 0.9998330 0.9998398 0.9997549 0.9998238 0.9997163 0.9998532 0.9998621
## [337] 0.9998343 0.9998268 0.9998378 0.9998121 0.9997139 0.9998461 0.9998648
## [344] 0.9998289 0.9998319 0.9998436 0.9998098 0.9997221 0.9998430 0.9998560
## [351] 0.9998426 0.9998463 0.9998550 0.9998273 0.9997417 0.9998603 0.9998732
## [358] 0.9998635 0.9998720 0.9998758 0.9998568 0.9997428 0.9998626 0.9998473
## [365] 0.9998502 0.9998621 0.9998624 0.9998359 0.9997501 0.9998488 0.9998640
## [372] 0.9998583 0.9998459 0.9998545 0.9998577 0.9997690 0.9998342 0.9998555
## [379] 0.9998363 0.9998398 0.9998420 0.9998126 0.9997003 0.9998249 0.9998233
## [386] 0.9998114 0.9998081 0.9998141 0.9997876 0.9996092 0.9997857 0.9997895
## [393] 0.9997649 0.9997645 0.9997721 0.9997344 0.9995540 0.9997058 0.9996874
## [400] 0.9996696 0.9996886 0.9996903 0.9995884 0.9993878 0.9996268 0.9996508
## [407] 0.9995948 0.9995144 0.9995753 0.9995177 0.9991799 0.9995612 0.9995880
## [414] 0.9995448 0.9995643 0.9995840 0.9995390 0.9993024 0.9995646 0.9996481
## [421] 0.9995654 0.9995264 0.9995794 0.9996099 0.9994420 0.9996382 0.9996742
## [428] 0.9996911 0.9996554 0.9996598 0.9996915 0.9996333 0.9997532 0.9997532
## [435] 0.9998014 0.9998293 0.9998605 0.9998763 0.9998481 0.9998850 0.9999015
## [442] 0.9998936 0.9999138 0.9999375 0.9999527 0.9999366 0.9999558 0.9999614
## [449] 0.9999680 0.9999696 0.9999676 0.9999696 0.9999605 0.9999737 0.9999753
```

```
## [456] 0.9999776 0.9999768 0.9999757 0.9999730 0.9999668 0.9999768 0.9999794
## [463] 0.9999796 0.9999775 0.9999794 0.9999759 0.9999686 0.9999768 0.9999801
## [470] 0.9999784 0.9999751 0.9999736 0.9999709 0.9999596 0.9999724 0.9999736
## [477] 0.9999717 0.9999709 0.9999697 0.9999665 0.9999515 0.9999710 0.9999700
## [484] 0.9999642 0.9999613 0.9999632 0.9999566 0.9999297 0.9999563 0.9999560
## [491] 0.9999542 0.9999467 0.9999501 0.9999411 0.9999072 0.9999445 0.9999467
## [498] 0.9999401 0.9999393 0.9999375 0.9999254 0.9998880 0.9999294 0.9999349
## [505] 0.9999307 0.9999239 0.9999305 0.9999258 0.9998840 0.9999315 0.9999324
## [512] 0.9999284 0.9999251 0.9999287 0.9999207 0.9998928 0.9999362 0.9999367
## [519] 0.9999328 0.9999285 0.9999306 0.9999286 0.9998925 0.9999399 0.9999446
## [526] 0.9999372 0.9999363 0.9999386 0.9999293 0.9998892 0.9999405 0.9999447
## [533] 0.9999372 0.9999371 0.9999465 0.9999381 0.9999130 0.9999487 0.9999506
## [540] 0.9999326 0.9999507 0.9999534 0.9999505 0.9999254 0.9999609 0.9999608
## [547] 0.9999608 0.9999584 0.9999581 0.9999583 0.9999382 0.9999635
```

```r
pt(df$Recovered, df=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##   [8] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [15] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [22] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [29] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [36] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [43] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [50] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [57] 0.1586553 0.7301026 0.8930018 0.7919315 0.1586553 0.7919315 0.6228720
##  [64] 0.6228720 0.9384573 0.8930018 0.8583933 0.7301026 0.9282827 0.9337570
##  [71] 0.9337570 0.9680142 0.9545864 0.9760016 0.9545864 0.9337570 0.8780756
##  [78] 0.9680142 0.9141028 0.6228720 0.9337570 0.9588986 0.9461098 0.4220200
##  [85] 0.8930018 0.9425365 0.8780756 0.7919315 0.9337570 0.7919315 0.9141028
##  [92] 0.9384573 0.9046975 0.8930018 0.4220200 0.9858325 0.1586553 0.8780756
##  [99] 0.8313197 0.9141028 0.4220200 0.7919315 0.1586553 0.1586553 0.4220200
## [106] 0.7301026 0.1586553 0.7919315 0.1586553 0.1586553 0.1586553 0.8313197
## [113] 0.8930018 0.6228720 0.7301026 0.8313197 0.9282827 0.9141028 0.9141028
## [120] 0.7301026 0.9141028 0.9141028 0.9425365 0.9520730 0.9545864 0.9640243
## [127] 0.9778461 0.9607619 0.9827171 0.9789259 0.9218273 0.9745915 0.9848387
## [134] 0.9860610 0.9730053 0.9812151 0.9845681 0.9881608 0.9855965 0.9903967
## [141] 0.9902889 0.9909969 0.9848387 0.9907065 0.9901785 0.9855965 0.9893299
## [148] 0.9836950 0.9867041 0.9915264 0.9794273 0.9890598 0.9884765 0.9934520
## [155] 0.9957211 0.9956998 0.9958644 0.9931403 0.9948243 0.9923512 0.9917685
## [162] 0.9941991 0.9922829 0.9939557 0.9934520 0.9946646 0.9952246 0.9955901
## [169] 0.9962090 0.9935013 0.9957630 0.9949748 0.9964720 0.9968454 0.9968222
## [176] 0.9979992 0.9991071 0.9991760 0.9987455 0.9988398 0.9987270 0.9986599
## [183] 0.9989059 0.9989996 0.9988506 0.9987437 0.9989394 0.9991534 0.9992995
## [190] 0.9989196 0.9989381 0.9994960 0.9991089 0.9988975 0.9993939 0.9990178
## [197] 0.9988716 0.9993371 0.9989236 0.9992135 0.9992358 0.9993668 0.9992898
## [204] 0.9992898 0.9993909 0.9993310 0.9992213 0.9993018 0.9994063 0.9993602
## [211] 0.9995818 0.9995878 0.9996115 0.9995106 0.9994895 0.9995905 0.9995940
## [218] 0.9995567 0.9996818 0.9995905 0.9996064 0.9996152 0.9995358 0.9995800
## [225] 0.9994784 0.9993481 0.9995554 0.9995340 0.9995904 0.9996586 0.9996180
## [232] 0.9996842 0.9996850 0.9996980 0.9996858 0.9997144 0.9997126 0.9997071
## [239] 0.9997272 0.9997517 0.9997298 0.9997451 0.9997418 0.9997473 0.9997556
## [246] 0.9996944 0.9997888 0.9998069 0.9998218 0.9998137 0.9998265 0.9998597
## [253] 0.9998766 0.9998926 0.9998858 0.9999031 0.9998897 0.9998881 0.9998891
## [260] 0.9998779 0.9998723 0.9998918 0.9998972 0.9998843 0.9998828 0.9998736
```

```
## [267] 0.9998862 0.9998587 0.9998664 0.9998870 0.9998784 0.9998768 0.9998872
## [274] 0.9998980 0.9998896 0.9998821 0.9998984 0.9998784 0.9999018 0.9998947
## [281] 0.9998877 0.9998899 0.9998786 0.9998739 0.9998555 0.9998710 0.9998808
## [288] 0.9998587 0.9998606 0.9998728 0.9998707 0.9998684 0.9998694 0.9998777
## [295] 0.9998740 0.9998649 0.9998714 0.9998612 0.9998407 0.9998321 0.9998502
## [302] 0.9998552 0.9998098 0.9998361 0.9998525 0.9998572 0.9998595 0.9998541
## [309] 0.9998454 0.9998427 0.9998515 0.9998343 0.9998163 0.9998175 0.9998140
## [316] 0.9998217 0.9998180 0.9998359 0.9998356 0.9998071 0.9998294 0.9998491
## [323] 0.9998261 0.9998161 0.9998180 0.9998067 0.9998077 0.9998291 0.9998202
## [330] 0.9998200 0.9998082 0.9997715 0.9997504 0.9997928 0.9998281 0.9998485
## [337] 0.9998392 0.9998309 0.9998266 0.9998148 0.9998320 0.9998244 0.9998308
## [344] 0.9998467 0.9998376 0.9998406 0.9998145 0.9997796 0.9997976 0.9998324
## [351] 0.9998007 0.9998122 0.9998275 0.9998039 0.9997796 0.9997988 0.9998826
## [358] 0.9998612 0.9998585 0.9998364 0.9998329 0.9998458 0.9998366 0.9998273
## [365] 0.9998455 0.9998649 0.9998771 0.9998492 0.9998343 0.9998496 0.9998645
## [372] 0.9998637 0.9998701 0.9998601 0.9998547 0.9998549 0.9998665 0.9998495
## [379] 0.9998481 0.9998379 0.9998519 0.9998158 0.9998296 0.9998411 0.9998211
## [386] 0.9998336 0.9998219 0.9998520 0.9998011 0.9998284 0.9998208 0.9998531
## [393] 0.9998142 0.9997913 0.9998141 0.9998005 0.9997513 0.9997539 0.9997856
## [400] 0.9997920 0.9997624 0.9997542 0.9997860 0.9997147 0.9998029 0.9997938
## [407] 0.9997697 0.9997440 0.9997345 0.9997331 0.9997504 0.9997003 0.9996929
## [414] 0.9995921 0.9995601 0.9996091 0.9996160 0.9995106 0.9996020 0.9995804
## [421] 0.9995365 0.9995491 0.9995852 0.9995335 0.9995444 0.9995558 0.9995761
## [428] 0.9995290 0.9996221 0.9994793 0.9996022 0.9995368 0.9995446 0.9995579
## [435] 0.9996080 0.9996508 0.9996655 0.9996334 0.9996506 0.9997079 0.9996728
## [442] 0.9996799 0.9997721 0.9997634 0.9998107 0.9997992 0.9997772 0.9998408
## [449] 0.9998643 0.9998474 0.9998777 0.9998936 0.9998912 0.9999531 0.9999443
## [456] 0.9999591 0.9999506 0.9999442 0.9999470 0.9999557 0.9999669 0.9999626
## [463] 0.9999682 0.9999676 0.9999685 0.9999705 0.9999723 0.9999738 0.9999750
## [470] 0.9999744 0.9999724 0.9999706 0.9999748 0.9999913 0.9999812 0.9999821
## [477] 0.9999805 0.9999789 0.9999810 0.9999768 0.9999760 0.9999741 0.9999757
## [484] 0.9999717 0.9999671 0.9999692 0.9999702 0.9999701 0.9999642 0.9999709
## [491] 0.9999675 0.9999666 0.9999640 0.9999597 0.9999606 0.9999568 0.9999573
## [498] 0.9999520 0.9999437 0.9999524 0.9999516 0.9999484 0.9999361 0.9999449
## [505] 0.9999365 0.9999288 0.9999342 0.9999306 0.9999364 0.9999263 0.9999368
## [512] 0.9999246 0.9999218 0.9999223 0.9999300 0.9999250 0.9999159 0.9999268
## [519] 0.9999253 0.9999156 0.9999309 0.9999252 0.9999238 0.9999196 0.9999257
## [526] 0.9999243 0.9999173 0.9999272 0.9999309 0.9999245 0.9999163 0.9999334
## [533] 0.9999301 0.9999192 0.9999345 0.9999381 0.9999345 0.9999283 0.9999388
## [540] 0.9999358 0.9999219 0.9999443 0.9999433 0.9999420 0.9999356 0.9999513
## [547] 0.9999481 0.9999410 0.9999487 0.9999514 0.9999457 0.9999447
```

```
pt(df$Deceased, df=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
##  [1] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [8] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [15] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [22] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [29] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [36] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [43] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [50] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [57] 0.1586553 0.1586553 0.4220200 0.1586553 0.1586553 0.4220200 0.1586553
## [64] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [71] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
```

```
##  [78] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [85] 0.1586553 0.4220200 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [92] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
##  [99] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [106] 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553 0.1586553
## [113] 0.1586553 0.4220200 0.1586553 0.4220200 0.4220200 0.1586553 0.1586553
## [120] 0.4220200 0.4220200 0.4220200 0.4220200 0.1586553 0.4220200 0.1586553
## [127] 0.7301026 0.1586553 0.4220200 0.1586553 0.4220200 0.1586553 0.4220200
## [134] 0.4220200 0.4220200 0.1586553 0.1586553 0.4220200 0.1586553 0.1586553
## [141] 0.4220200 0.1586553 0.1586553 0.1586553 0.1586553 0.4220200 0.1586553
## [148] 0.1586553 0.1586553 0.1586553 0.1586553 0.4220200 0.4220200 0.4220200
## [155] 0.1586553 0.1586553 0.1586553 0.1586553 0.6228720 0.1586553 0.1586553
## [162] 0.1586553 0.1586553 0.6228720 0.6228720 0.6228720 0.4220200 0.4220200
## [169] 0.6228720 0.4220200 0.6228720 0.6228720 0.4220200 0.4220200 0.4220200
## [176] 0.8313197 0.7919315 0.8313197 0.6228720 0.6228720 0.7919315 0.4220200
## [183] 0.6228720 0.7301026 0.8930018 0.4220200 0.6228720 0.7301026 0.8780756
## [190] 0.7301026 0.8313197 0.7919315 0.6228720 0.8780756 0.8313197 0.8583933
## [197] 0.7301026 0.9141028 0.8780756 0.9141028 0.9337570 0.8583933 0.8780756
## [204] 0.9046975 0.9282827 0.9425365 0.8313197 0.9218273 0.9141028 0.9337570
## [211] 0.9141028 0.8780756 0.8583933 0.8780756 0.8780756 0.7919315 0.8780756
## [218] 0.9141028 0.9218273 0.9218273 0.9141028 0.9282827 0.9337570 0.9282827
## [225] 0.9282827 0.9384573 0.9425365 0.9384573 0.9425365 0.9282827 0.9384573
## [232] 0.9046975 0.9282827 0.9520730 0.9461098 0.9520730 0.9545864 0.9568498
## [239] 0.9588986 0.9607619 0.9588986 0.9588986 0.9568498 0.9607619 0.9624637
## [246] 0.9702167 0.9568498 0.9607619 0.9624637 0.9624637 0.9654603 0.9607619
## [253] 0.9640243 0.9654603 0.9624637 0.9654603 0.9607619 0.9588986 0.9568498
## [260] 0.9624637 0.9640243 0.9667863 0.9607619 0.9588986 0.9640243 0.9667863
## [267] 0.9624637 0.9667863 0.9654603 0.9667863 0.9568498 0.9640243 0.9680142
## [274] 0.9667863 0.9691547 0.9680142 0.9691547 0.9588986 0.9667863 0.9691547
## [281] 0.9667863 0.9680142 0.9691547 0.9640243 0.9607619 0.9691547 0.9702167
## [288] 0.9654603 0.9667863 0.9667863 0.9588986 0.9545864 0.9680142 0.9691547
## [295] 0.9667863 0.9691547 0.9654603 0.9680142 0.9607619 0.9640243 0.9667863
## [302] 0.9680142 0.9624637 0.9654603 0.9680142 0.9588986 0.9667863 0.9691547
## [309] 0.9721356 0.9702167 0.9730053 0.9691547 0.9624637 0.9721356 0.9753167
## [316] 0.9667863 0.9702167 0.9730053 0.9702167 0.9640243 0.9738224 0.9680142
## [323] 0.9680142 0.9624637 0.9702167 0.9712081 0.9680142 0.9680142 0.9607619
## [330] 0.9607619 0.9461098 0.9588986 0.9654603 0.9384573 0.9640243 0.9691547
## [337] 0.9712081 0.9624637 0.9588986 0.9654603 0.9545864 0.9640243 0.9654603
## [344] 0.9654603 0.9624637 0.9607619 0.9624637 0.9568498 0.9654603 0.9667863
## [351] 0.9545864 0.9624637 0.9680142 0.9588986 0.9492656 0.9667863 0.9520730
## [358] 0.9588986 0.9545864 0.9624637 0.9568498 0.9492656 0.9545864 0.9568498
## [365] 0.9545864 0.9607619 0.9520730 0.9588986 0.9492656 0.9461098 0.9568498
## [372] 0.9492656 0.9545864 0.9461098 0.9545864 0.9461098 0.9545864 0.9520730
## [379] 0.9461098 0.9520730 0.9461098 0.9425365 0.9337570 0.9520730 0.9461098
## [386] 0.9384573 0.9425365 0.9337570 0.9425365 0.9461098 0.9384573 0.9492656
## [393] 0.9384573 0.9384573 0.9520730 0.9425365 0.9337570 0.9461098 0.9425365
## [400] 0.9384573 0.9461098 0.9461098 0.9337570 0.9282827 0.9461098 0.9384573
## [407] 0.9337570 0.9384573 0.9282827 0.9425365 0.9218273 0.9425365 0.9337570
## [414] 0.9425365 0.9492656 0.9425365 0.9337570 0.9282827 0.9141028 0.9141028
## [421] 0.9282827 0.9384573 0.9384573 0.9282827 0.9218273 0.9461098 0.9425365
## [428] 0.9218273 0.9384573 0.9282827 0.9141028 0.9282827 0.9384573 0.9461098
## [435] 0.9520730 0.9607619 0.9492656 0.9461098 0.9218273 0.9568498 0.9607619
## [442] 0.9568498 0.9588986 0.9680142 0.9654603 0.9588986 0.9691547 0.9607619
## [449] 0.9691547 0.9680142 0.9654603 0.9712081 0.9691547 0.9730053 0.9789259
```

```
## [456] 0.9819974 0.9823646 0.9819974 0.9823646 0.9807980 0.9848387 0.9851000
## [463] 0.9862822 0.9839968 0.9864964 0.9872905 0.9867041 0.9890598 0.9909021
## [470] 0.9910897 0.9907065 0.9909969 0.9902889 0.9900656 0.9910897 0.9922829
## [477] 0.9932474 0.9939131 0.9950890 0.9954024 0.9955901 0.9951167 0.9942759
## [484] 0.9952246 0.9955446 0.9956346 0.9953530 0.9950325 0.9955446 0.9959420
## [491] 0.9943507 0.9935975 0.9958644 0.9961923 0.9959036 0.9930296 0.9944594
## [498] 0.9955446 0.9950038 0.9949454 0.9958041 0.9946314 0.9947931 0.9941202
## [505] 0.9901785 0.9903967 0.9924842 0.9922829 0.9908053 0.9938700 0.9942378
## [512] 0.9936446 0.9926752 0.9926752 0.9860610 0.9921426 0.9916893 0.9939131
## [519] 0.9930296 0.9940799 0.9935975 0.9886281 0.9915264 0.9939131 0.9941599
## [526] 0.9939131 0.9933513 0.9920705 0.9910897 0.9913569 0.9930296 0.9932474
## [533] 0.9900656 0.9933513 0.9924183 0.9893299 0.9851000 0.9916893 0.9917685
## [540] 0.9929154 0.9934520 0.9911806 0.9869055 0.9935975 0.9944594 0.9934021
## [547] 0.9932474 0.9925490 0.9891966 0.9845681 0.9926752 0.9941599
```

```r
qt(df$Confirmed, df=1 ,ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qt(df$Confirmed, df = 1, ncp = 1, lower.tail = TRUE, log.p = FALSE):
## NaNs produced
```

```
##   [1] -Inf -Inf -Inf  Inf  Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [16] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [31] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  NaN  NaN -Inf  NaN  NaN -Inf
##  [46]  NaN  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [61]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [76]  NaN  Inf  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
##  [91]  NaN  NaN -Inf  NaN -Inf -Inf  NaN -Inf -Inf  Inf  NaN  NaN  NaN  NaN  NaN
## [106]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [121]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [136]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [151]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [166]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [181]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [196]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [211]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [226]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [241]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [256]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [271]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [286]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [301]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [316]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [331]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [346]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [361]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [376]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [391]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [406]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [421]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [436]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [451]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [466]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [481]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [496]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [511]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
```

```
## [526]    NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
## [541]    NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN   NaN
```

```r
rt(df$Confirmed, df=1, ncp=1)
```

```
##   [1]    3.62715103   20.46446960    4.19084870   -0.38480306    1.04752273
##   [6]    0.94710242    1.62048157    1.78901449   -0.22003656    0.50337999
##  [11]    0.76768141    1.42230311    0.76110234    0.64649514    5.06487652
##  [16]    1.96073655    1.49827415    0.77730958    0.18570138   -0.90436856
##  [21]    3.52132627    1.13840826    1.69653909   -0.64156622    3.72979273
##  [26]    2.92401994    4.04782466    5.28526770    0.81721945   -1.09553148
##  [31]    1.80376721    2.74429944    0.92360858   -0.52711805    2.74535599
##  [36]    0.57002680    4.73566986    0.24934724    1.64435337    2.01407608
##  [41]    2.40882824    9.61836513    5.91706708    2.71119735    3.01780057
##  [46]   -2.53499842    1.76899873    1.45349419   29.11336080    0.53084706
##  [51]    2.34504447   48.52219571    0.98264457    5.59722413    0.41637940
##  [56]    0.36900238    0.71553146    1.59328236    2.58091220    2.27916159
##  [61]    0.26241505   -2.30731906    2.37400622    9.04842310   -0.06871147
##  [66]    1.46964728    0.66957867    1.91725310    0.11501243   -1.32744744
##  [71]   -0.18065711    2.93084295    4.00552315    1.10666103   -0.03692905
##  [76]    0.64244044    1.74490337    0.32559776    1.18789653    1.13068997
##  [81]    3.22820962   -0.02803500    3.88970009    7.85188594    4.87845825
##  [86]    0.99659895 1444.52910160    1.24922042    2.76830580    5.84070486
##  [91]    6.91421200    1.02450924    0.65247239    2.18083862    3.67284141
##  [96]    1.91458023   -0.58381158    0.32925096    4.68339163   16.68173109
## [101]    0.54295184    2.66587597   30.84882459    0.89724497    0.57143986
## [106]    1.98951885    2.60089667    4.50912089    8.88356784    0.64510823
## [111]    7.64270787    9.02387533    1.37813423    0.91208194   -0.14534487
## [116]    1.22731902   84.55084487    2.03117337    5.33421502    0.35698351
## [121]    0.09380054    6.98745520    1.00679859    1.38433651    1.63924003
## [126]    0.48878479    2.61296447    0.42090232   19.33722423    1.38396690
## [131]    5.39650707    0.23258255    0.50879038    0.89809095    0.17661836
## [136]   -0.74433463    7.44320408    2.13817432  305.85520099    6.07436690
## [141]    0.45513380    9.75221100   -0.66026957   14.34205693   -0.24487794
## [146]   -8.99700050    0.06056837    9.13759633   16.66153523   -0.64298453
## [151]    0.69672539    3.68814959    7.14512932    0.49753197    3.78688532
## [156]    1.69868883    0.78891293    4.25052260    0.54488810    1.10419728
## [161]    0.32974798    3.70275749    1.23498858    4.43771487    1.11630119
## [166]   -0.40518099    1.27017068    2.00655759    0.17743060    1.21488428
## [171]    0.30370436    2.06406321   -0.41739354   31.24939089    0.36105555
## [176]    3.20421984   38.67521141    0.07803571   13.35241504    0.18921995
## [181]    0.53932075    2.51711336    0.14098373    2.16669876    3.74388308
## [186]    0.40289571    4.23709102    1.67228441    2.64083139    0.70503951
## [191]   -1.57819256    2.08967185    0.79817182    3.52766366    7.10627732
## [196]    7.23330861    0.62216852    1.48731505    2.53762894    6.99047687
## [201]    1.17904854    0.26488484    0.01233349   -0.04274479    1.24823940
## [206]    4.42011934    0.39762507   18.41482379    4.39629620    0.69027109
## [211]    2.26099684    0.99182759    5.94197753   -0.08733137    0.57617281
## [216]    1.58011540   -1.58592966    1.76383268    2.20782072    0.76973738
## [221]   -0.44141235    4.41200312    8.18115492    2.51797185    3.37895676
## [226]    1.83892018   -0.61637545    1.35782902    1.79689690    3.46932087
## [231]    1.26544933    1.44830739    0.26105083    2.00863385    0.13264989
## [236]    2.50516393    0.57211290    9.69535384    6.42459466    1.01284291
## [241]    0.83347580   -0.61832668    0.53173576    0.53592989    2.36278452
## [246]   10.81301821    3.45873169   -3.35670672    1.83925270   -0.78453900
```

```
## [251] 1551.03294308    0.58306390    0.95924420   -0.17553223    0.50922521
## [256]    2.42690442   16.13920096    3.28868984    1.91602786    0.19806949
## [261]    2.15919655   -0.70368822    2.11399293    0.08030753    0.24870092
## [266]    1.08068673    1.26134857   -0.38242910   87.62019757    3.73868075
## [271]    1.78529300    1.93235608    3.03672737    1.17020577    2.28810146
## [276]    0.16405409    0.91991575   28.44235966    0.20885649    1.94028377
## [281]   33.46313629    2.77074378    0.93974095    0.04066612   -0.72004238
## [286]    0.62490461    5.55481803   -0.16093355   -6.87077907   75.40810365
## [291]   -0.45908671    2.27095240    6.81589625   -0.68948226    0.77669324
## [296]    2.66900034   -0.05239503    1.03733105   -0.03440121    1.05588848
## [301]    2.10981369    3.13078353    0.62603999   -0.63044648    1.92441321
## [306]    6.21939177    0.26105670    1.01602756    0.83334213    0.58035859
## [311]   10.68731856    3.25390536    0.77599066   -0.72356892    1.34678185
## [316]    4.92234787    0.57138121    2.49123161    2.27656251    1.90985426
## [321]    1.92118343    1.21455137    3.96752489    0.90224807    1.93903290
## [326]   22.54370625    0.93192867   -0.36848509   18.96704389    2.04162667
## [331]   -9.08842367   25.52557414    0.19073974  -34.31809105    1.38964432
## [336]    2.98107049    2.32475536    1.67796267    5.50313458    0.52255487
## [341]    9.07235998    1.59044496    0.29375825    6.19341247    1.03674317
## [346]    6.73572337   -0.04730537    9.17197606    0.55566171    0.42209006
## [351]    0.47883565    2.12610279    0.56804375   -0.36157533  -20.14553347
## [356]    5.55520938    8.81763916    6.78596763    0.82288393   -0.39801617
## [361]    1.88112554    1.25500517    0.28295102    0.07490239    3.50934479
## [366]    3.78173767    1.60581620    1.86952950   32.53557237   19.78096321
## [371]  105.85311857    1.68373641    8.43890505    3.41674985    0.66809078
## [376]    0.75164522    0.15321692    2.37005547    3.61900862    0.59355775
## [381]    0.84262977    0.12000922    4.23812186    0.08267075    0.98089835
## [386]    0.69993610    1.78705553    1.48568905    1.42532593    0.68841712
## [391]    0.20687390    2.14600826    2.23981830    0.18604485   -0.07856168
## [396]   -8.45147463    2.84645291  -20.34325019  -23.45686598   -1.19180498
## [401]   -4.01502211    5.26088267    9.35084653    0.06920461   -1.89898677
## [406]    2.43528124    0.21759963    1.79923184    7.86963581    1.07719625
## [411]    2.37612953   -0.72854333    3.36847517    0.90366256    1.15271899
## [416]    2.03525571    1.53484627   -1.70010763   27.66125939    0.07998081
## [421]    6.78346651    2.10273922    1.02298069   -0.10599685    5.63200185
## [426]    2.08681389    2.77775191   -0.36126584    9.13636059   32.20825066
## [431]   -2.29244586    1.86107545   -0.38859244    9.40017646    1.73472519
## [436]   94.72016520   26.13117185    1.24391258    0.31871875    0.49173522
## [441]   -1.96301721    1.30603700    3.51581994    4.85353007    1.32809480
## [446]    1.01634148    0.31370579    1.15458326    8.36015430    1.71201168
## [451]    2.78710063   11.93922206    5.15019753    1.70031855    0.99750652
## [456]    1.60321000    2.92988720    0.56680843    1.22416631    4.01866340
## [461]    0.49955189    2.32597919    7.43804474   -0.07221374   21.14486483
## [466]    0.73827067    1.59692734   -0.85628531    3.76138665    2.08048907
## [471]    1.30909862    4.21359453    2.13718352   -0.64822038    9.73623584
## [476]    1.22845274    0.48414280    0.55875338   22.91441083   27.47731125
## [481]    0.72238981    2.02391713    6.41295106    7.67234676   -1.73916607
## [486]    1.25715464    1.01313369    0.56929956    3.91721813   -0.14184938
## [491]    1.02873358    2.08730635    1.27652624    5.11412034    2.38630733
## [496]    5.49551562    1.45528217    0.25903344    1.09506354    0.03796925
## [501]    0.50680696    3.45263398    0.85466386    0.42585194    1.32645350
## [506]    0.62174166    3.33935712   21.31952597    1.81278744    3.98633366
## [511]    1.79096258   -0.35401181    5.64942010    0.03691359    0.75251254
## [516]    1.37578893    0.83947686   -0.25621420    1.65493499    5.02269175
```

```
## [521]    1.25026803   51.57053976   31.81154472   -0.19397339    5.36844947
## [526]    1.47889195    0.10155337    1.95098579    0.70703657    1.15452303
## [531]    0.63863507    0.29178270    1.50296426   -1.51461957    0.15077833
## [536]    2.22887515   -0.82790490    1.20725930    0.94569707    0.71819881
## [541]    1.95704072    3.52493378    1.01727732    0.05734363    6.94036532
## [546]    1.99858065    0.85004571    0.08803400    7.14077957    3.70191506
## [551]    6.96918726    2.93404028
```

```r
rt(df$Recovered, df=1, ncp=1)
```

```
##   [1]  3.001858e+00  1.343284e+00  7.859909e-01  2.436572e+00  7.629942e+00
##   [6]  7.542160e-01  6.677508e-01  1.240169e+00  1.182269e-01  6.362340e+01
##  [11]  1.237490e+01 -1.587928e+00 -2.574835e-01  4.474418e+00  3.640348e+00
##  [16]  4.858884e+00  4.200301e+01  1.201752e+00  3.654648e-01  4.027274e-01
##  [21]  9.420662e-01 -8.757808e-01 -1.554016e+00  7.845250e+00  3.150962e+01
##  [26] -1.524927e+01  2.087224e+00  5.134440e-01  4.729615e-01  3.076146e-01
##  [31]  2.629318e+00  4.586502e-01  5.203779e+00  4.375947e+00  3.703763e+01
##  [36] -9.712762e-02  2.368382e+01  1.665282e+00  7.816467e-01 -2.909497e+00
##  [41]  5.106705e+00 -8.949746e-01  2.699555e+01  1.851789e+00  4.365856e-01
##  [46]  1.290944e+00  2.184652e+00  2.908399e-01  7.913980e-01  1.649851e+01
##  [51]  1.944110e+00 -4.922797e-01  1.177097e+01 -1.021472e+00  8.275891e+00
##  [56]  1.818689e+01  1.987202e+00  9.711563e-01  5.526299e+00  1.611019e+00
##  [61]  1.101362e+00  3.156795e-01  1.019201e+00  9.248263e+00 -2.446372e+00
##  [66]  1.078565e+00  8.762775e-01  1.742746e+00 -7.044319e-01  6.138944e+00
##  [71]  1.522153e+00  3.192170e+00  3.990425e+00  9.120374e-01  3.047848e+00
##  [76]  3.193883e+00  1.599271e+00  4.573902e-02  1.013055e+01  1.063906e+00
##  [81]  4.713675e+00 -3.240359e-01  8.969802e-01  2.091373e+00  1.361191e+00
##  [86]  2.822429e-01 -6.972374e-01  7.187808e-02 -1.128296e+00 -7.392151e-01
##  [91]  4.565739e-02  2.432258e+00  1.238685e+01  4.189013e-01  3.005226e-01
##  [96]  6.413442e+00  1.184493e+00  1.656219e+00  1.017725e+01  8.490902e-01
## [101]  1.257847e+00  7.837346e-01  2.506175e+01  1.161399e+01  4.761494e+00
## [106]  2.370961e+00  2.830560e-03  1.148045e+01  1.718287e+01  1.077726e-01
## [111]  3.148447e+00  8.833753e-01  1.404478e-01  7.758110e-01  4.289699e+00
## [116]  2.361460e+00  1.005045e+00  1.980143e-01  8.949413e-01  1.692485e+00
## [121]  1.370388e+00  3.923414e+01  4.733339e-01  4.018961e+00  1.091270e+01
## [126]  7.410856e-01  1.923439e+00  1.719452e+00  1.442990e+00  3.578412e-01
## [131]  1.636103e+00  1.557031e+00 -1.533686e-01  7.887907e-01  1.119003e+00
## [136] -6.643754e-01  1.518489e+00  5.577271e+01  2.258287e+00  1.602505e+00
## [141] -2.072835e-01  2.065962e+00  1.192000e+00  2.497440e+00  1.916343e+00
## [146] -8.043654e+00  9.617888e+00  2.349294e+00  2.058752e+00  4.108939e+00
## [151]  3.632261e+00  6.255112e+00  1.055336e+00  7.094648e-01 -1.318304e-02
## [156]  2.446549e+00  1.375172e+00  3.723474e+00 -1.553208e-01  5.535938e+01
## [161]  7.722963e+00  9.539780e-01  1.288064e+00  5.822521e+00  2.633044e+01
## [166]  5.725169e+00  9.976155e-01  2.260820e+00  2.530040e+00  2.696155e+00
## [171]  1.631435e+00  1.881075e+00 -9.549711e-01  1.765265e+00  2.029448e+00
## [176]  5.553228e-02  1.224306e+00  4.157166e+04  1.419999e+00  1.735141e+00
## [181]  3.296497e+00  5.185134e-01  1.944816e+00  1.818852e+00  3.893007e+00
## [186]  1.424514e+00 -9.502971e-01  8.394944e+00  2.776746e+00  7.862901e+01
## [191]  1.363065e+01  1.875898e+00  2.534849e+01  3.928821e+00  9.046924e+00
## [196]  7.979489e-01  5.516083e+00  3.737844e-01  1.568418e+00 -2.183129e+01
## [201] -2.666033e+00  7.934155e-01  1.886438e+00  2.715673e+00 -4.286429e+00
## [206]  2.707605e-02  1.458822e+00  1.883870e+02  3.102603e-01 -3.114952e-01
## [211]  3.502162e+00  1.982487e-01  1.113045e+00  3.904272e+00  2.433304e+00
## [216]  1.505385e+01  6.318697e-01  6.518535e-01  2.148387e+00  9.872554e-01
## [221]  2.488407e+00  3.339983e+00  2.547982e+00  3.972346e-01  1.324002e+00
```

```
## [226] -1.076607e+00  2.394623e+00  1.088121e+01 -1.072204e+00  5.073749e-01
## [231]  7.635247e-01  1.116981e+00 -4.181246e-01  2.709419e+00  3.535285e-01
## [236]  1.378596e+00  1.462166e-01  5.038914e+00  2.292697e+00  1.528520e+00
## [241]  2.131330e+00  7.064188e-01  7.361658e-01 -3.238453e-01  1.091382e+00
## [246]  2.691043e+00  1.931199e+00  9.755872e+00  2.271934e+00  7.530551e-01
## [251]  3.963436e+02  1.840389e+00 -2.266516e-01  5.728139e-01 -2.667547e-01
## [256]  1.991665e+01  2.281520e+00  1.427603e+01  1.098191e+00  2.527217e+00
## [261]  1.269264e+01  9.840087e-01  8.828553e-01  1.393980e-01  3.740277e-01
## [266]  1.603127e+00  1.566617e+00 -8.033536e-02  1.600928e+01  2.645287e+00
## [271]  2.277924e-01  2.676081e+00  7.524993e-01  5.525861e-01  7.536345e+00
## [276]  1.551558e+00  8.615674e-01  4.273977e-01  4.369092e+00  4.016828e-01
## [281] -1.775357e-01  2.652769e+01  3.763682e+00  1.243040e+00  8.211427e+00
## [286] -1.884350e+01  2.259125e-01  4.472960e+00  1.148275e+01 -1.854542e-01
## [291]  1.611760e-01 -2.699744e+01  2.829782e+00 -2.338341e-01  2.286909e+00
## [296]  1.248473e+01 -2.228828e-01  1.802921e+00  1.634369e+00  4.328037e-01
## [301]  9.676181e+00  1.739232e+00  7.145056e+00  4.388854e+00  3.889093e+00
## [306] -8.039372e-01  2.571141e+00  5.534225e+00  9.527047e-01  9.833268e-01
## [311]  5.528473e+00  4.889642e+00  3.929155e-01  3.892928e-01 -3.777430e-02
## [316] -6.459419e-01  1.301608e+00  7.269141e-01  2.282188e+00  3.214637e-01
## [321]  9.868843e-02  1.229538e+00  2.353835e+00  2.508514e-01  5.333419e-01
## [326]  5.931249e+00 -9.754030e+00  6.588807e+00  3.076540e+00 -2.388541e+00
## [331]  2.276833e+01  2.251702e+00  9.213216e+00  8.337138e+00  3.733398e+00
## [336]  1.299592e+01  4.107944e-01  1.620420e+00  7.536865e-01  1.877523e+00
## [341] -1.212001e-01  4.744919e-01  1.359411e-01  2.773362e+00  6.678639e+00
## [346]  6.535757e-01  1.513060e+00  5.956368e-01  2.028032e+00  7.488348e-01
## [351]  4.910786e+00  2.974992e+00  9.417479e-01  8.166735e+00 -7.129537e-01
## [356]  9.475680e-01  4.346933e-01  5.124069e-01  3.801134e+00  1.773973e+00
## [361]  9.562047e+00  1.186022e+00  1.006980e+00 -1.694917e+00 -9.734264e-02
## [366]  1.063285e+00  6.615478e-01  6.561220e-01  3.607390e-01  5.563122e+00
## [371]  8.220050e-01  1.900921e+01  1.196737e+00  2.094796e+00  1.343518e+00
## [376]  1.464376e+01  2.982740e+00  2.955652e+00  2.561433e+00  2.882414e+00
## [381]  1.988199e+00  1.648238e+01  7.024172e+00 -3.894974e-01  1.707429e+00
## [386] -6.203918e-01  1.626235e-01  6.550308e-01  2.029850e+00  4.024137e-01
## [391]  5.289471e+00  5.953619e+00 -3.781792e-02 -1.192564e-03 -1.081324e+01
## [396]  1.377052e+01  2.288821e+00  5.212128e+00 -8.245306e-01  1.178750e+00
## [401]  7.092012e-01  6.518379e+00  4.751626e-01  1.730251e+00  1.319243e+01
## [406]  9.733717e-01  3.649414e+00  2.084714e+00  3.710852e+00  4.362778e+01
## [411]  3.375354e+00  7.942435e-02  4.827988e-01  4.066934e-01  3.701109e+00
## [416] -5.680712e-01  1.171536e+00  3.518677e+00  2.125751e+00 -9.192110e-01
## [421]  1.624522e+00  9.443456e-01  3.695487e-01  4.835479e-01  2.710454e-01
## [426]  9.605658e-01  3.559308e-01  3.587757e+01  6.783620e-01  4.313856e+00
## [431]  9.032668e-01  2.394290e+00  1.582621e-02 -1.533021e+00  7.784839e+01
## [436]  2.298680e+00  1.193565e+00  1.531288e-01  7.220231e-01 -9.079052e+00
## [441]  1.515989e+00  4.324794e-01  2.239204e+00  3.721265e+00  1.870959e+00
## [446]  1.629433e+01  9.169163e-01  3.409607e+00  4.538356e+00  7.359392e-01
## [451] -7.353479e-02 -2.277252e+00  1.522644e+00  3.945780e+01  3.107657e+00
## [456]  2.076191e+00  8.413911e-01  6.049227e-01  3.436458e-01  2.792045e+01
## [461] -1.313603e+00  1.871556e+00  4.667799e-01  6.452210e+00  6.708061e+00
## [466]  1.231586e+00  7.399589e-01  2.904923e+00 -8.610670e-01  1.669612e-01
## [471]  3.848618e+00  5.929870e+00  1.786728e-02  1.781577e+00  3.327679e+00
## [476]  2.972776e+01  5.355237e+00 -1.501105e-01  1.086282e+00  3.006750e+00
## [481] -9.945172e-01 -2.132615e-01  4.615503e-01  5.080041e-01  5.549658e-02
## [486]  1.794808e+00  1.306169e+00 -5.346964e-01  4.219004e-01  1.044915e+00
## [491]  1.137788e+00  3.857894e-01  3.472181e+00  7.677420e-02  3.590456e-01
```

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```
## [496]   7.818945e+00   8.139845e+00   1.110557e+00  -7.964582e-01  -2.746746e-01
## [501]   2.868317e+01   5.839341e+00   8.653939e+00   1.245474e+00   5.435413e+00
## [506]   3.052004e-01  -1.628635e-01   1.173276e+00   2.418261e+00   1.951823e+00
## [511]   5.114463e-01   2.854790e+00   5.354048e-01   3.155942e+00   3.098049e+00
## [516]   2.574021e+00   6.489476e+00   9.870757e-01   1.450432e+01   1.671785e+00
## [521]   1.527568e+00  -6.888566e-01   2.194000e+00   1.137288e+00   9.031401e-01
## [526]   3.160037e+00   1.333472e-01   2.011818e+00   3.430512e+00   3.511695e-01
## [531]   1.416597e+01   9.035990e-01   5.149696e-01   1.143749e-01   9.962650e-01
## [536]   8.703749e-01   3.234415e-01   2.477819e-01   9.150987e-01   1.149076e+00
## [541]   1.914323e+00  -3.483413e-01   3.949501e+00   4.165341e+00   1.130514e+00
## [546]   2.389971e-01   8.441250e-01  -1.787685e+00   3.156993e+00   3.979665e+00
## [551]   1.630127e+00   4.743278e-01
```

```r
rt(df$Deceased, df=1, ncp=1)
```

```
##   [1]     1.30178766     8.68236242     1.41998353     1.25582486     1.18177743
##   [6]   235.54742459     0.87974935     7.34861327     1.04425679     1.44468394
##  [11]    -5.54235728     0.33615580     0.43547674     3.86679598     1.94313611
##  [16]     1.23423104    -0.06982223     0.94698932     0.69146948     1.54605025
##  [21]     1.89377267     2.14969707     1.94780770     0.77880787    -0.26353414
##  [26]     0.98852124     4.17907660     2.25307827     0.13864699    -8.72806010
##  [31]     0.39741081     0.40109432     3.99563671     0.06294292    20.57855575
##  [36]     0.77114423     2.58506245    27.88380088     0.25499661    41.39460346
##  [41]     0.88477925     1.03190677     3.84713493     0.32954020     0.30535633
##  [46]    19.44510718    -2.47271045    -0.77963739     1.84015671     1.02654514
##  [51]     0.98535221   240.74058982    -0.08457837     0.18252825    -0.91071401
##  [56]     2.89283431     9.70926264    -0.80482958     4.26391952     3.00604637
##  [61]  -142.33704484     1.31876981     2.80261442     6.66237663     3.67537811
##  [66]     4.98936867     2.75919591    11.17432855     0.52780774     2.23656690
##  [71]     0.40130883     0.51313235     0.96043140     0.70343921     0.41825044
##  [76]     2.84609343     1.26901769     1.41997761     0.60261841    -0.20947979
##  [81]    25.72954171    10.53660319     1.24793045     4.64013567    -0.89141970
##  [86]     0.57238043     1.60530975    -0.57275498     2.06803052     0.83142429
##  [91]    -0.44012882     9.96798045    -0.98458227     3.00353703     8.40270649
##  [96]     0.62258005     2.42952534    -3.97803127     5.96332178     7.69457035
## [101]    11.39610984     3.11783047     3.22302772    -3.62148555     2.46403232
## [106]     0.14054683     2.04100698   159.12572668    -0.05177289     2.12617401
## [111]     7.64480939     0.66316240     0.32025493     1.35417486     1.03329132
## [116]     0.19805822     3.60111338     0.26190374     2.31104973     1.58681703
## [121]    -1.14915117     1.05610311     2.80940272     1.22864945     1.61524538
## [126]     2.27108007    -0.26602439     1.99699670    28.38935491     1.28297777
## [131]     3.43970489     1.93994365     0.39173568     0.62449569     1.29460414
## [136]    34.80172497    17.87482207     0.38585617    -0.19041246     1.70816514
## [141]     0.22460870     1.89220276     0.65455210    -0.16484920     0.56632369
## [146]    -1.63568814     1.48391875     0.68472338    77.49691503     0.48711561
## [151]     1.22816875     1.90717918     0.80113195    -2.66857520    -6.41463892
## [156]     2.57190125     8.53761913     7.36621501     1.69459845     5.59045195
## [161]     2.55954525     1.97265479     2.77839651     6.12017872     4.27876538
## [166]     8.03148955    -0.83144618     0.56522266     0.40812587     1.61571446
## [171]    18.18857019     0.24752559     1.13103718     0.72079804    -0.06649825
## [176]     4.06249471     1.12422952    -0.47923182     1.35852459     0.97065234
## [181]     3.19682619     2.85431096    32.84365322   104.01428497     1.95039782
## [186]     0.27365065    -2.74270446     1.03840411    -0.19785086   109.07877685
## [191]     0.96415877     3.05963759     2.99897764    15.06147424    -0.39491220
## [196]    59.38318948     3.01667817    -1.15381715     0.58769361     1.34569365
```

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## [201]     1.60588685   -0.17395914     1.92170363   -0.44468879    -0.12183829
## [206]     0.73328015    1.00957214    -0.32322420    3.38932844    -0.40824505
## [211]     0.76608553    0.94211021     0.27245854   -0.27363711    -0.22174613
## [216]     3.02216989    1.96076926     0.43231467    2.91178395     0.87322904
## [221]     4.16479636   -1.12038119     3.99520510    2.24053624     0.31042354
## [226]     0.67204057    1.47725004     0.64316679    3.55911694     2.61155253
## [231]     0.82339116    1.66699051     1.01836275   22.64192987     2.44056281
## [236]     0.86515570   45.26497287     1.79651925    1.32302933    -0.01842285
## [241]     0.85329910    2.85499660     6.35957471    2.02370140    33.66384396
## [246]     1.40624659    1.89682660    -0.89026246   -0.54899951     0.17496883
## [251]     5.01192693    4.71589110     1.12941396    3.34363066     0.46097451
## [256]     4.15731390    1.78499917     0.99213230   11.47811925    -0.04300100
## [261]     0.30114714    0.85942028     0.74780844    1.36977659     1.16273858
## [266]    -0.02102889    2.14062526    -0.52202032   44.50605394     4.82235379
## [271]     1.05994652    1.09581261    -0.77485146    1.00301826     1.05430090
## [276]     1.32735988    1.09930580     0.58589665    2.44962543   277.11920835
## [281]     3.18948695    3.76389633    -0.35354492    0.93351807     1.15578084
## [286]     4.13104928    1.95965502   145.60849650    0.88017649    -0.91740759
## [291]    70.43147997    0.12217628    -0.08685896    0.65188027     3.60285005
## [296]     2.47875085    0.33260211     2.57913874    1.71340258    10.97022800
## [301]    20.29672141   -0.23748941    -0.03050561    1.92384774     3.80990618
## [306]     1.14599179   42.44582042     1.96840148    1.91013655     0.71584438
## [311]     0.20052418    2.20155384     1.44323025    0.95240599    -0.12886816
## [316]    -0.80140320    0.45787806     1.82438009    2.63256187     1.83198377
## [321]     0.79090815    5.68867330     0.33930009    1.43161491     2.68828095
## [326]    -5.08199210    2.33048786    13.78676786    1.58298035     1.65963908
## [331]     0.47146755    0.97260505     6.52792000    0.42781312     5.41191112
## [336]     1.91793698    2.60251764     0.42533019    1.07783206     4.36971690
## [341]    -1.08388669   -0.08486518     1.33430004    1.46145611     0.59301001
## [346]     0.72268727    0.07392788    -3.34564126    0.93469444     0.80759027
## [351]     1.71095119    0.57978434     2.17938850    1.13723545     1.27027644
## [356]     0.91866167    1.04765311     0.03864797   -0.56729587     4.89034952
## [361]   286.22497632    6.68925243     1.63646966    1.41719897     2.25180974
## [366]     1.00514385    4.36877656     0.14258381    2.69829582     0.13045609
## [371]    -0.98419894    0.89717483     4.20459271   -0.08216420   119.76834311
## [376]    -0.26114000   -0.12661527     2.08030459   -0.50791084    -0.27767625
## [381]     0.78472638   -0.42325491     3.57677009    0.41487178    -0.01395263
## [386]     4.14055491    0.99381968    -0.96251663    7.36674444     1.04877808
## [391]     0.18662247    2.60261137     1.22935117    0.34629485     6.74649679
## [396]    12.20790893   -0.88911671     7.36935961    3.42127199    12.95113334
## [401]     1.66875821    5.91760398    14.97503054    1.44668154     1.37384262
## [406]     0.02398325    1.34547472     2.07511306   -1.03213886     0.21438318
## [411]     1.71379594    0.69711957     0.99296678    0.69433994     0.13041601
## [416]    -1.37182576    4.41536535    -5.42739782    1.76204674     2.60763339
## [421]     0.40704801    1.25471924    16.44700279    3.92614053     0.74450949
## [426]     0.70492469    1.76279877     0.22969698    3.96184159     2.09375033
## [431]     1.83112746    0.94885162     6.43887977    1.05440222     3.56492255
## [436]     2.66268903    1.92173693     1.43552926    1.79305757    10.74860022
## [441]     2.88873742    2.11587589     1.90295796   -0.51323828     1.46304979
## [446]     0.11520489   -0.16633219     0.37772727    0.24989054     1.16924585
## [451]     2.56233724    1.26263755    11.96633697    5.21939814     0.44454701
## [456]     0.94648713    0.20051874     0.89496462   12.95707564    -0.75582615
## [461]     6.40958961   -0.01986434    -1.53478993    2.11387469     1.30985901
## [466]     4.11342783    1.37124082    10.80583901   35.64664474     1.11385659
```

```
## [471]    1.18380581    2.37984135    0.75375097   -2.60757785    9.64291986
## [476]  -14.77972077    8.61889390   22.51814546    5.10614328    1.28921094
## [481]    1.46990598    6.55235231   51.71847887    0.80562543    0.09461657
## [486]    2.07685012    0.24029610   -1.55950867    1.79173125    1.70130705
## [491]    2.25977326    1.97197469    2.75024929   20.48788098    8.44980779
## [496]   12.28003097    0.71534315   12.11710378    2.09060172    2.36743611
## [501]    1.58010700   -1.84495131    1.63784057   10.53566664    1.78688405
## [506]    0.61990076   -3.62761118   -0.09270270    4.78492069   -1.05301616
## [511]    2.60636342   67.62314368    1.86018640    0.64702885    1.03007137
## [516]   21.73565709    4.55328412    1.04238112   -0.24346548   -1.52661885
## [521]    2.56708683    1.40143337    0.91076770    1.46881977  -11.57007582
## [526]    3.76503263   17.63660947   -0.17291269    0.33597195    1.80262472
## [531]    7.64327029    3.87361908   -6.14234625    1.00225437    0.69488392
## [536]    1.35288892   -0.16247900   -0.34301992   -5.82258773    0.40284722
## [541]   -0.25204704    1.79638367    4.79056558    0.59631785   47.76284413
## [546]   18.74690388    1.31157138    1.15538710    1.18672894    0.46761515
## [551]    0.83709283    2.93553686
```

```r
rt(df$Confirmed, df=1)
```

```
##   [1]  6.130977e-01  3.219943e-01 -3.578001e+00 -1.932404e+00 -2.067189e-02
##   [6]  1.627169e-01 -7.439715e-01 -2.009164e+00  8.115642e-01 -5.303415e-01
##  [11] -1.324919e+00 -1.088505e+00 -2.389629e-01  1.491486e+01 -6.806722e-01
##  [16] -1.054302e+01  3.493925e-01 -1.100672e+01  4.004420e-01 -2.930697e+00
##  [21]  6.452264e+00 -5.193367e-01 -1.389172e-01 -4.215732e-01  2.225861e+00
##  [26] -3.918468e-01  4.533158e-01 -5.938824e-01 -4.657260e-01 -1.000071e-01
##  [31]  2.928040e+00  6.733136e-01 -3.667628e-02  1.504218e+00  9.544125e-01
##  [36]  4.220850e-02 -4.675835e-01  2.149853e-01 -2.026859e+00  1.234326e+00
##  [41]  1.190324e+00 -7.874909e-01  5.364130e-01  7.528250e-01 -1.243496e+00
##  [46] -1.047964e-01 -5.157310e-01 -1.434457e+00  1.332996e+00 -1.061168e+01
##  [51] -1.798878e+01 -1.448420e+00  1.779305e+01 -1.955563e-01 -4.551439e-01
##  [56]  2.194264e-02 -7.227946e-01 -1.417782e+00  1.411123e+00  1.202336e+00
##  [61]  5.607286e-01 -3.968916e-01 -2.735315e-02 -2.154716e+00  6.724767e-01
##  [66]  1.226131e+00  4.238490e-01  1.630014e+00  7.848974e-01 -1.061418e-02
##  [71]  1.036595e+00 -1.451825e-01  4.805476e+00 -5.605627e-01 -7.521259e-01
##  [76] -4.039917e-01 -9.757973e+01 -1.316361e+01 -2.396288e+00 -1.930094e+00
##  [81] -1.636319e+01 -5.417311e+00  2.526701e+00 -3.056876e+00 -2.825873e-01
##  [86]  1.252569e+00  2.883021e-01 -1.211106e+00  3.915735e-01 -1.408472e-01
##  [91] -4.805833e-01  2.740822e+00  4.294531e+00  1.013336e+00  3.998259e-01
##  [96]  1.575788e+00  6.241799e-01 -1.059120e-01  6.205053e-01  1.392257e-02
## [101]  1.082773e+00 -3.061516e+00 -1.368742e-01 -6.695475e-01  1.483335e+00
## [106] -3.393069e-01  3.124369e+00 -5.936376e-01  7.519971e-01 -3.395678e+00
## [111] -5.500616e-01  5.407748e+00 -9.114255e-01  8.783598e+01  5.367065e-01
## [116]  3.677391e+00 -1.493741e-01 -4.841266e-01  2.348316e+00 -4.695255e-01
## [121] -9.919923e+01 -9.735525e-02  5.407968e-03  7.427076e-01  7.036438e-01
## [126]  1.365218e-01 -1.418051e+00 -9.742721e-01  1.565973e-02 -1.196846e+01
## [131]  2.972742e+00 -1.227770e-01  5.612560e-01 -2.281915e-01 -8.275549e-01
## [136] -3.664605e+00  6.682772e+01 -9.140216e-01  6.843084e-01 -1.147040e+00
## [141] -1.394657e+00 -1.946634e+00  1.256118e+00 -1.652005e+00  2.529284e+00
## [146] -8.093158e+00 -1.615355e+00 -1.722735e+00 -2.685405e+00  1.284483e+00
## [151]  5.553736e-01  3.161670e+00 -1.491368e+00  4.022075e-01  7.066642e-01
## [156]  1.152143e+00 -1.557148e+00 -9.459738e-01 -2.148087e-01 -1.130249e-02
## [161] -2.228476e-01  7.248617e-01 -2.683705e+00 -3.188054e-01  2.321299e-01
## [166] -5.944589e+00 -1.684072e+00  7.962919e-01  5.952953e-01  1.689319e+00
## [171] -2.078056e+00  2.386767e-01  5.944732e+00 -5.754341e-01 -1.082326e+00
```

```
## [176]   3.235224e+00 -6.069797e-01 -5.851335e+00 -4.105899e-01  2.904203e-01
## [181]  -1.780195e+01  5.256441e-01  5.895190e+00 -4.473238e-01  3.419157e+00
## [186]  -9.853183e-01  5.312360e-02 -2.324093e-02 -3.314835e-01 -5.016075e-02
## [191]   5.048175e-01 -1.024711e+00  8.855270e+00  1.784651e+00  2.303524e-01
## [196]   4.559437e-01  9.354280e-01 -1.096814e+00  2.677823e-01  1.994868e+00
## [201]  -1.050277e+00 -1.870180e+00  2.342447e+00 -1.130844e+00 -1.104105e+01
## [206]   2.956078e+00  3.584215e-01  7.238182e+00 -8.791870e-01  7.860932e-01
## [211]  -2.351245e-01 -1.225729e+00 -1.845671e+00  2.486005e+00 -9.086046e-01
## [216]  -2.423472e+00  1.997544e+00  2.107347e+00  1.125986e+01  1.117357e+00
## [221]   4.773775e-01 -2.477666e+00 -1.674353e-01  6.419792e-01 -1.347813e+00
## [226]  -2.010530e+00 -3.447715e+00 -1.874832e+00  1.713502e+00  4.361926e+00
## [231]   4.859026e-01  2.391485e+00  2.319360e+01 -2.922657e+00 -1.811592e+01
## [236]   3.376803e-01 -9.703065e-01  2.535378e-01 -4.794983e+00 -4.660370e+00
## [241]   2.720396e+00 -1.104165e+00 -2.351180e-01  6.657121e-01 -1.536239e+00
## [246]   3.790362e+00 -6.987080e-01  2.666183e+00  1.786305e+00 -1.128944e+01
## [251]   2.630733e+00 -3.451515e+00 -1.979360e-03 -9.360047e-01  2.747619e+00
## [256]   1.074761e+00 -2.969459e+01 -1.176095e+00  1.441651e-01  1.423028e+00
## [261]   8.528760e-02 -2.306354e+00 -5.345907e-01  1.266619e-01 -3.318190e+01
## [266]   2.205230e-01  2.232313e+00 -1.357649e-01  3.657711e-02  1.742468e-01
## [271]  -4.488307e+00  8.839653e-01  9.795551e+00 -3.464011e+00 -5.158176e-01
## [276]   3.372474e+00 -1.453541e+01  3.642381e+00 -3.024461e-01 -5.815315e+00
## [281]  -8.815587e-01 -2.453236e+00 -3.357002e-01 -3.025837e+00 -8.913537e+00
## [286]  -1.063280e+00  7.021903e+00  1.063183e+00 -2.659112e+00 -2.480653e-01
## [291]  -2.535261e+00 -1.882131e-01 -3.838278e-01  4.117294e+00 -4.243759e-01
## [296]  -2.329376e-03 -2.705625e-01 -6.625331e-01 -1.734742e+00 -8.550993e-01
## [301]   1.216740e-01  1.824341e+01 -4.257438e+00 -4.741996e-01 -1.768987e-01
## [306]   1.893115e+00  1.955516e-01  8.738819e-02  7.437579e-01 -7.764363e+01
## [311]   2.014185e-01  1.769127e+00 -6.127645e-01  1.319238e+00  1.832727e+00
## [316]   4.745599e-02  6.236883e+00  8.069144e-01  9.404956e+00 -1.549646e-01
## [321]  -2.400020e-01 -8.651972e-01 -3.827530e-01  5.213909e+01  1.315161e-01
## [326]   4.576351e-01  3.472559e+00 -9.800608e-01 -4.734253e-01 -4.147536e+02
## [331]   4.171053e-01 -2.568239e+00 -1.738316e+00 -2.074227e+00  1.661599e+01
## [336]  -2.638096e-01 -2.838217e-02 -2.181005e-01  3.556162e-01 -9.945771e-02
## [341]  -7.278832e-01 -8.850745e-01 -1.057756e+00  5.751322e-01 -7.390102e-02
## [346]   2.199035e+00  2.591480e-01 -5.387738e+00 -2.895939e+00  2.132870e+00
## [351]   1.681933e-02 -1.925432e+01  1.133356e+00  1.244528e+00 -8.577779e-01
## [356]  -1.058739e+00  5.337225e+00  5.328839e-01 -1.975534e+00 -3.471214e-01
## [361]  -3.851046e-02 -1.767474e+01  2.997323e+00  2.932592e-01  1.018347e+00
## [366]   8.987842e-01 -3.165715e-01  6.129306e+00  1.806480e-01 -4.719414e+00
## [371]   1.943708e+00 -3.044730e+00  1.321170e+01 -1.213312e+00  5.648948e+00
## [376]  -2.108696e-01  1.013741e-02 -2.170100e+00 -8.810335e-01  3.210254e+00
## [381]   3.203337e+00 -7.644668e-01  2.629750e+00 -8.278807e+00 -2.129876e+00
## [386]  -1.083962e+00 -2.297902e+00  1.083220e+00  3.503452e-01  4.332577e-02
## [391]   1.051359e+00 -1.481172e-02 -1.572700e-01 -1.021466e+00  8.226562e-01
## [396]  -1.102456e-01 -2.003803e+00  1.015579e-01  6.547593e-01 -1.243694e+00
## [401]  -1.431747e+00 -8.013179e-01  3.915370e+00  1.137976e+00  3.061082e+01
## [406]  -7.618929e+00 -1.944854e+00 -2.065060e-01 -1.029567e+00  4.370373e+00
## [411]  -4.992702e+00 -2.559227e-01 -1.809540e+00 -2.930707e-01  1.601885e+00
## [416]  -6.435834e+00  4.072403e-01  1.679709e+00  3.047457e-01  5.158792e+01
## [421]   3.135735e+00  8.001805e-01 -1.191774e+00  2.046287e+00  1.233868e-01
## [426]  -5.726316e+00  3.761467e-01 -2.675009e-01 -1.631585e+01  2.360630e-01
## [431]  -1.027294e+00  2.930256e+01  4.285168e-01  2.357188e+00  7.842580e-01
## [436]   4.682524e-01 -7.613699e-01  2.652486e+00  9.506507e-01 -1.162520e+00
## [441]  -2.367217e+00 -1.424255e+00 -1.217421e+00  5.253086e+00  7.552944e-01
```

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## [446]  -9.880587e-01 -7.512721e+00 -1.137357e+00 -3.412669e-01  7.782453e+00
## [451]  -6.789672e-01 -8.046264e+00  1.316642e+00 -1.802024e-01 -8.574365e-01
## [456]   9.014773e-01 -3.576731e-01 -3.693934e-01  8.921837e-02 -5.347175e-01
## [461]  -3.168753e+00 -1.580294e-01  1.851830e-01  2.071591e-01  9.183851e+00
## [466]  -8.303610e-01 -5.018014e+00 -2.622314e+01  1.865690e+00 -1.056622e+00
## [471]   9.531242e-01 -1.023856e+00  1.373268e+00 -9.138868e-01  5.075215e-01
## [476]   1.098092e+00 -2.030245e+00  3.519460e-01  3.589639e+00  1.261112e-01
## [481]   1.993570e+00 -3.424965e+01  5.096878e-01  1.892183e+00 -7.074968e-01
## [486]  -4.542771e-01 -1.636887e+00  3.367249e+00 -2.961077e-01  1.766730e+00
## [491]   3.719671e+00  5.128303e-01  1.966413e+00  2.198293e+00 -4.945988e+00
## [496]   9.194218e-01 -5.513647e-01  4.509413e+00  2.015542e+00 -1.272318e-01
## [501]  -4.104618e-02 -4.740589e-01  4.498502e+00 -6.894135e-01 -1.495307e+00
## [506]  -6.362044e-01 -9.914542e-01  3.819651e+00 -8.052573e+00 -1.961106e+00
## [511]  -8.589602e-01 -2.540364e+00 -4.433244e-01  9.415500e-01  5.247624e+00
## [516]   8.134104e-01 -8.443707e-01 -8.101158e-01  9.645059e-01  4.191130e+00
## [521]  -7.976436e-02 -4.784440e+01 -4.810827e-01  3.435073e-01 -6.345869e-02
## [526]   2.101135e+00  3.882822e-01 -4.299735e-01  4.721292e-01 -6.123093e-01
## [531]  -4.406173e+00  1.060750e+00  6.789337e+00  7.365177e-01 -1.143871e-02
## [536]   5.010488e-01  6.673542e-02 -7.273290e+00 -1.588583e+01  1.452645e+00
## [541]  -2.728658e+00 -1.915341e+00  2.115804e+00 -1.017535e+00 -1.101363e+00
## [546]  -1.189578e+00  2.526282e-01  3.703842e-01  4.938505e-01  1.067483e-01
## [551]  -7.510351e-01 -7.408901e-01
```

```r
rt(df$Recovered,df=1)
```

```
##   [1]  -8.016186e-01  3.086646e+00  1.016029e+00  4.001479e+00 -1.473070e+00
##   [6]  -6.424580e-01 -1.971512e+00  1.466555e+00  2.919623e-01  1.552286e+00
##  [11]   3.226393e+00  9.819283e+00  5.986345e+00  3.810952e-01 -3.372991e+00
##  [16]  -1.441029e-01  5.382147e-02 -3.709035e+01  4.412229e-01  4.152790e+00
##  [21]  -1.375137e+00  1.056131e+00  6.786811e-01  1.953960e-01 -2.395211e+00
##  [26]   3.094822e-01 -1.502391e-01 -1.196947e-02  6.019772e-01 -9.086707e-01
##  [31]  -7.417056e+00 -4.653478e+00  4.664864e-01 -2.937379e-01  1.000098e+02
##  [36]   1.812783e-01 -1.279325e+00 -1.183070e+01 -6.228227e+00  2.100144e+00
##  [41]  -1.647455e+01  2.133504e+00  8.332993e+00 -6.705321e-01 -6.258971e-01
##  [46]  -1.926235e+00 -7.779914e-01  4.570960e-01 -3.090749e-01  3.031017e-01
##  [51]   6.497053e+00 -3.207347e-01  1.781413e-01 -1.107585e-01 -8.672645e-01
##  [56]  -1.435382e+00  5.003141e-02  1.075770e+00  3.401206e-01 -9.445534e-01
##  [61]   7.098167e+00  5.933398e-01 -1.911214e+00 -2.225463e-01  2.184353e+00
##  [66]  -4.929532e-01 -1.317994e+00 -2.535888e+01  3.727106e-01 -2.081321e-01
##  [71]  -3.899000e-01  4.434372e-01 -2.366978e+00  3.092755e+01  9.253811e-01
##  [76]  -2.226127e+00  7.230193e-01  7.143944e-01  5.656471e+01  1.061413e+00
##  [81]   1.042250e+00  2.800828e-01  8.949018e-01 -3.662091e+00  3.449815e-01
##  [86]   1.415745e+00  1.813551e-01 -7.880108e-01 -1.192779e+00  1.680605e-01
##  [91]   3.418934e+00  1.717245e+01  5.218782e-01 -1.298528e-01  4.709312e+00
##  [96]  -2.483031e+00 -1.063190e+00 -8.873608e-01 -3.644112e+00 -1.083004e+00
## [101]  -2.547969e+00  6.089571e-01  2.947123e-01 -9.665515e-01  2.318004e+00
## [106]   2.111894e-01 -2.325659e+01  1.374849e-01 -2.431465e-01  4.735036e-01
## [111]   1.345927e+00 -3.684259e-01 -1.819681e+00 -1.722785e+00 -5.633079e-02
## [116]   8.820717e+00 -8.257875e-01  9.497925e-01 -2.268530e-01 -8.139002e-02
## [121]  -1.139997e+00  6.290779e+00 -9.152678e-01  4.512004e-01  6.722091e-02
## [126]  -7.384754e-01  1.263781e+00  9.769597e+00  5.275108e-01 -5.139532e-01
## [131]   1.695253e+00 -1.381580e+00  1.947443e+00 -5.131235e+00 -5.631409e-02
## [136]   1.689389e+00  2.602741e-01  6.879799e-01 -1.046835e-01  1.190196e+00
## [141]  -1.295860e+00  1.169942e+00  1.291322e+00  2.905974e-03 -2.168760e+00
## [146]   1.227178e+00  2.768795e+00 -2.304550e+00  4.622976e-01  2.945991e+00
```

```
## [151]  -5.515867e-01   5.502207e-01  -6.288336e-02   1.613850e+00  -1.368577e+01
## [156]  -4.595516e-01  -2.943908e+00   6.607753e+01   3.642586e+01  -3.542831e-01
## [161]   7.476027e-01  -3.264959e+01  -3.390227e+00  -1.290611e+00   4.729458e+00
## [166]  -1.587191e+00  -7.509258e-01  -1.615114e+00  -1.083827e+00   7.908763e+00
## [171]  -1.162118e+00   9.911573e-02   6.384082e+00  -1.538004e+00  -1.339410e-01
## [176]  -5.762401e+00  -3.532616e+00  -8.952443e+00   1.025594e-02  -9.639134e-01
## [181]   3.239417e-01  -2.468207e-02  -9.504406e-01   1.937660e-01  -1.493521e+00
## [186]   3.022072e+00   3.535977e-01  -7.979024e-02   2.979486e-02  -6.519906e-01
## [191]  -3.028316e-01   7.475992e+00   5.078658e+00   1.825054e-01   6.698690e-01
## [196]  -2.202311e+00  -3.103554e-01  -2.876855e-01  -5.367416e-01  -1.221782e+00
## [201]   3.710289e+00  -8.187959e-01  -9.220990e-01  -4.202743e+00  -1.095898e+01
## [206]  -3.879889e-01  -1.522312e+01   5.954330e-02   4.234968e-01   5.840961e-01
## [211]   1.255657e+00   1.029036e+00   3.415231e+00  -3.978094e+00  -1.397082e+00
## [216]   9.518673e+00  -1.099939e+01   3.889537e+00   2.612107e+00   3.575656e-01
## [221]   8.102301e-01   1.558261e-01  -4.321550e+00   5.284061e+00   4.680336e-02
## [226]   9.950524e-01  -1.231770e+00  -8.078474e-01  -2.238269e+02  -5.156404e-01
## [231]  -2.011348e+00   1.106432e+00   9.086713e-01  -8.346642e-01   2.733414e-01
## [236]   1.898123e-01   5.562767e-01  -3.373611e+00   1.413338e+00  -1.479359e-01
## [241]  -8.123730e-01  -5.034330e-01   3.077411e+00  -3.635365e+00   8.839098e-01
## [246]  -6.310292e-01  -1.178999e+00   1.755555e+00   8.632656e+00  -2.889076e-02
## [251]  -2.557460e-01  -3.580878e-01  -1.386554e+00  -4.460948e+00   1.364425e+00
## [256]   8.230504e-01  -7.519009e+00   2.926479e-01  -3.596317e-01  -3.159311e-01
## [261]  -7.339078e-01   1.601624e+00  -9.331621e-02   4.630521e+00   8.558918e-01
## [266]   9.234001e-01  -3.807952e-01  -6.416755e-01   1.631166e+00   5.367462e-01
## [271]  -7.203028e-01  -8.725007e-01  -1.971103e-01  -2.707004e-01   2.092845e+00
## [276]  -1.733931e+00   5.899993e-01   1.627659e+00  -3.328189e+00  -1.362279e+00
## [281]   4.650345e+00  -7.214563e-01   4.980521e-01   4.295494e-01   4.864322e+01
## [286]  -3.961070e-01   3.588853e-01  -1.847809e+00  -3.516225e-01  -1.623576e+00
## [291]   6.768587e-01  -2.675997e+01  -8.427217e-01  -4.720132e-01  -7.795395e+00
## [296]  -2.326082e+00   5.385196e-01   8.375771e-01   2.323159e+00  -3.116112e-01
## [301]   5.443966e-02   2.459555e-01   1.133540e+00   4.718040e-01  -8.870352e-01
## [306]  -2.103026e+01  -1.237132e+00  -7.665890e-02  -1.072770e+00  -1.819023e+01
## [311]  -7.645303e-02   6.861936e+00   1.403863e+00   3.474405e-01   2.761339e-01
## [316]   1.919941e+00   1.273334e+00   8.259829e-01   1.904705e+00  -1.743625e+00
## [321]  -2.104080e+00  -9.227379e-02  -3.063174e+00  -1.139105e+00   9.082737e-01
## [326]   5.976242e+00  -8.828815e-01  -4.220411e-02  -2.101564e+00  -2.575051e+00
## [331]  -2.437537e+01   1.097714e+00   1.917082e+00  -5.206803e-02  -3.045807e+00
## [336]   2.346013e+00   6.026196e+00   2.525970e+00   1.122165e+00  -8.543155e-01
## [341]  -1.333961e+00  -2.280588e+00   1.143812e+00   1.218062e+00   1.431377e+00
## [346]   9.693693e+00   1.473862e-02  -1.422602e-01  -7.765293e+00   5.005782e-01
## [351]   2.067201e-02  -4.231412e+00   1.129731e+00  -1.188589e+00  -4.246055e+00
## [356]  -1.405205e+00  -2.970374e-01   1.079428e+00  -1.146672e+00   9.442505e-01
## [361]   2.626304e+00   2.398267e+00   4.412300e-01   2.335158e-01   1.395468e+00
## [366]  -4.359369e-01   1.481887e+00  -1.633329e+00   2.202588e+00  -8.282901e-01
## [371]  -1.537846e+00   6.631065e-01  -1.528156e+00  -1.398329e+01   1.318832e+00
## [376]  -1.206977e+00   2.354365e+00  -4.635953e-01   6.216998e-01  -5.425843e-01
## [381]  -2.430832e-02   4.389136e+01  -4.270951e-01  -5.972048e-01  -1.049852e+00
## [386]   6.740672e-01   8.826778e-01  -3.406349e+00  -5.035427e-02  -1.069631e+00
## [391]   1.542406e+00  -3.356374e+00   3.936605e-01   8.280145e-02  -2.552015e+00
## [396]   5.384305e-01  -1.435153e+00   6.763892e+00   1.615019e+00  -3.416306e+01
## [401]   1.699000e+00   2.540335e-02  -6.632905e+00  -1.127381e+01   7.082614e-01
## [406]  -7.220642e-01  -8.448479e+00   6.632357e-01   1.410568e+00   4.877973e-01
## [411]   9.982500e-02   4.358348e+00   9.711050e-02   1.298051e+02   2.970168e+00
## [416]   2.016401e+00   6.314266e-01   2.736035e+01  -9.801015e-01   1.538341e+00
```

```
## [421]   3.610109e-01 -8.519402e+00  8.877737e+00 -1.627673e+00 -1.475064e+00
## [426]  -1.118758e+00 -2.720005e+00  3.725377e-01  2.915511e-01  2.787589e+00
## [431]   2.062058e+00 -3.281225e+00 -3.943822e+00 -9.274671e-01  1.704158e+00
## [436]  -1.083789e+00  1.161434e+00 -7.705435e-01 -1.419921e-01  5.167305e-01
## [441]   5.700089e-01  6.649724e-01  2.761576e-01 -3.503078e-01 -3.118296e+00
## [446]  -5.449997e+00 -3.531015e+00  1.767416e+00  3.345421e-01 -4.075549e+00
## [451]   4.695620e+00 -5.741811e-01  9.724356e-01 -1.607125e+00  1.520239e-01
## [456]  -5.550453e+00  9.043072e-01  3.345891e-01 -4.925384e+01  1.076065e+00
## [461]  -8.910379e+00  5.898778e-01 -1.358592e+01  3.143112e-01  3.263628e+00
## [466]   1.236959e+00  1.815808e+00 -1.235110e+00 -2.048496e+00  2.798538e+00
## [471]  -3.174961e+00 -7.668124e-01 -9.863908e-03 -7.127175e-02 -1.573002e+00
## [476]  -1.569135e+00 -3.104128e+00  2.562123e-01 -2.478224e-01  3.218463e-01
## [481]   1.356254e+00  3.133490e+00 -1.069345e+00 -3.399508e+00  3.508754e-02
## [486]  -2.191532e+00  2.771823e+00 -1.755030e-01  4.020071e+00 -3.851532e+01
## [491]   2.417296e+00 -1.287723e+00 -2.080170e+00  9.889836e-01  2.062570e+00
## [496]   6.842862e-01 -1.429479e+01 -1.211672e+00  2.239944e-01  3.892035e-01
## [501]   8.677214e-01 -1.426542e+00  1.011178e+00  6.994781e-01 -2.251334e+00
## [506]  -5.036599e+00  3.177789e-01 -7.300964e-02  1.091541e+00 -2.502881e+00
## [511]  -2.987862e+00  2.690145e+00  1.781634e+00  9.127354e-01  1.850092e+00
## [516]  -1.290866e+00 -7.512561e-02  4.632137e-01 -1.397616e+00  2.278880e-01
## [521]  -5.735229e-01  9.432303e+00  1.593223e-01  7.494839e-01 -8.829998e+00
## [526]  -7.814315e-01  1.387944e+00  1.452725e+00 -7.904273e-01 -9.740225e-01
## [531]   5.687696e-01 -3.287975e+00 -9.646987e-01 -6.515794e-01  2.769605e+00
## [536]   7.690104e-02 -8.835046e-01 -7.874021e-01  4.198493e+00 -2.198895e-01
## [541]  -7.615542e-01 -7.114877e-01  6.823628e+00  6.490813e-02  1.326399e+00
## [546]  -3.108024e+00 -1.014564e+01  9.357296e+00  4.148503e-01  8.720499e+01
## [551]   3.594174e+00 -1.354806e+00
```

```r
rt(df$Deceased,df=1)
```

```
##   [1] -5.822453e+00 -7.585308e-01 -4.512437e-02 -6.161605e-01 -1.081044e+00
##   [6]  6.368812e+00  3.736282e-01  4.946444e-01  5.792915e-01 -1.941247e+00
##  [11] -2.565830e-01  9.652245e+00  2.239195e+01  7.874092e-01  2.708198e-01
##  [16] -5.023664e-01 -1.500566e+01 -9.252379e-01 -4.934040e-01 -5.196883e+00
##  [21]  1.727097e+00  3.945402e-01 -4.920397e-01  1.637554e+00 -8.331047e-01
##  [26] -1.118114e+03 -3.711303e-01 -2.601505e-01 -1.927687e+00  2.215151e+00
##  [31] -5.427033e-01  2.468620e+00 -1.115574e+00 -5.354602e-01  2.667593e-01
##  [36]  2.097366e-01  3.584196e+01  2.850100e-01  2.393692e+01  9.392687e-01
##  [41]  1.880176e-01  7.222642e-01 -4.030938e-01 -2.566998e-01  1.932629e+00
##  [46] -5.463723e+00  5.831567e+00 -6.361300e-01 -1.947271e-01  1.783779e+00
##  [51] -9.395398e-02 -1.430405e-01  4.223288e-01  9.339066e-01 -6.828841e+00
##  [56] -5.199949e-02 -2.881933e+00 -5.230258e-02 -1.242700e-01  6.164710e-02
##  [61] -6.852808e-01 -9.682519e-01  6.627067e-01  1.766025e+00  9.102117e-01
##  [66]  1.138661e-01  7.182792e-01  1.163475e+00 -1.991509e+00  2.925310e-01
##  [71] -6.599079e-01 -5.103114e-01 -3.284081e-01  4.093399e-01  4.115203e-01
##  [76]  7.157186e-01 -8.136013e-01 -7.307729e-02 -1.400843e+00  5.938214e-01
##  [81]  1.519933e+00 -8.426129e-01 -2.321193e+01 -1.540459e-01  2.916190e-01
##  [86]  7.311317e+00 -8.741308e-03  1.834710e+00  1.689538e+00  1.100866e+00
##  [91]  1.781737e+01 -6.563147e+00 -1.920002e-01  6.971298e-02 -7.524013e-01
##  [96] -6.679491e-01  3.725080e-01  9.673480e-01 -2.649659e-01 -2.067763e+00
## [101] -5.299188e+00  8.618604e-01 -1.094083e+01  1.578610e+00  9.016365e+01
## [106] -1.348898e+00 -3.839463e+00  1.279302e+00 -1.125987e-01 -9.066594e-02
## [111]  1.717971e+00 -1.286654e+00 -8.073807e-01  2.163003e-01  9.884069e-01
## [116] -1.572272e-01 -4.357908e+00 -4.128409e-01 -2.238052e+00  2.840864e-01
## [121]  1.621994e+00 -1.646416e-01 -6.795173e-01 -2.417882e+00  7.596468e-01
```

```
## [126] -2.674238e+00  2.344345e+00  1.209043e+00 -2.511398e+00  3.360782e-01
## [131]  1.071379e+00  2.047447e+00 -2.530121e+00 -1.228380e+00  2.716424e-01
## [136]  1.723629e+00  5.529498e+00  1.259219e+00 -1.061271e+00 -3.398401e+00
## [141]  1.057980e+00  5.978121e-01  9.839220e-01 -1.053370e-01 -1.338358e+00
## [146]  3.577368e+00  2.383730e+00 -6.960009e-01  7.480202e+00 -3.765481e+00
## [151]  5.012848e-02 -3.052020e-01 -2.738534e+00  1.248377e+00  5.631751e-01
## [156]  4.952922e-01 -4.744220e-01  7.010778e-01 -2.714909e+00  1.252447e+00
## [161]  3.391859e+00  5.446401e+00  5.260057e+00 -2.042357e-01 -7.063377e-01
## [166]  5.760965e-01 -2.336235e+00  7.486086e-01  4.165546e-01  3.401871e+00
## [171]  1.013466e+00  8.041628e+01  7.512522e-01 -3.638558e-01  5.516591e-01
## [176] -2.230854e+00 -6.626400e-01  2.614849e+00 -6.527625e-01 -1.422630e+00
## [181] -5.824842e+00 -4.609454e-02 -9.360785e-01 -1.040651e+01 -1.157362e+00
## [186] -3.980709e-01 -9.166565e-01  3.896873e+00 -2.312892e+00  2.138878e+00
## [191]  7.460693e-01  3.320404e-01 -2.871384e-02 -2.755227e+03  3.597675e+00
## [196]  3.138284e+00  4.658865e-01 -4.026776e-01  1.353531e+00 -4.931453e-01
## [201]  1.036292e+00  1.061607e-01  1.271293e+00 -7.018835e+00  1.757372e+00
## [206]  1.156736e+00 -2.624904e+00 -7.725805e+00  6.636276e-01 -9.981315e-01
## [211] -3.634547e-01  6.791468e-01 -2.460688e-01 -7.695707e-01 -8.812514e+00
## [216]  5.238266e+00  6.651972e-01  1.805303e-01  3.635495e-02 -8.490293e-01
## [221]  7.786728e-01  5.149736e-01  7.083251e+01 -1.964066e+00  1.772143e-01
## [226] -2.920433e+01 -2.149697e-01  1.537205e+00 -4.748425e+00 -1.476240e+00
## [231] -3.294394e-01 -2.658709e+00 -7.366250e+01 -1.617817e+00 -1.140108e+00
## [236] -3.697060e-01 -1.156961e+00 -7.624106e-02  1.675096e+00 -1.513123e-01
## [241]  1.591204e-01 -1.327958e-01 -1.326529e+01  5.984591e+00 -2.138112e-01
## [246]  7.482906e+00  8.569183e+00 -2.043042e+00 -7.171407e-01  5.312183e-01
## [251] -4.730417e-01 -8.644167e-01  4.339215e-01  2.051666e+00  1.831339e+00
## [256] -2.590498e+00 -7.917545e-01  1.344123e+00  6.913683e-01 -3.959280e+01
## [261]  4.993430e-01  4.301692e-01 -1.577407e+00  1.415607e+00  1.928841e-02
## [266] -1.061087e+00  5.177714e-01 -1.096308e+00 -1.519135e+00 -1.897016e+00
## [271]  8.790499e-01  2.334834e+00 -1.731643e+00  7.955216e-01  2.299578e-01
## [276]  3.531109e+00  2.692848e+00 -9.322598e-02  1.058910e-01 -1.132466e+00
## [281]  3.704446e+00 -2.745474e+00 -3.667742e-02  6.025603e-02 -1.135040e-01
## [286] -1.081322e+01 -9.128482e-01 -1.679269e+00 -2.594033e-01  5.228325e-02
## [291] -2.217274e+00  1.741670e+00  3.610644e+00 -1.540847e+00  3.109397e-01
## [296]  5.850805e+00  6.147711e-01  1.534412e+00 -1.982662e-01 -2.373967e-01
## [301]  1.831881e-01 -2.180216e-01  2.655022e-01 -7.308356e+00  1.873355e+00
## [306] -7.737747e+00 -2.232644e+01  1.251220e+00  6.222923e-01  7.263710e-01
## [311] -7.500763e-01 -5.307812e-03  2.284790e+00  4.197633e-01  1.141841e+01
## [316] -1.430214e+00  1.144716e+00 -5.943034e-02 -2.568663e+00 -2.405493e+00
## [321]  6.913057e-01  2.505232e+01  2.862393e-01  1.762450e+00  3.098318e-01
## [326] -8.492102e-01 -3.738927e-01  8.001353e-01 -7.888706e+00 -2.255978e-01
## [331]  6.176102e-01 -9.347560e-02 -1.836002e+01  5.859770e-01 -2.339757e-01
## [336] -9.056981e-01 -9.695181e-01  2.725789e-03 -2.312728e+00 -6.877354e-01
## [341] -1.994414e+00  1.021496e+00 -1.778668e-01 -4.355977e+00  4.803276e+00
## [346] -3.058963e+00  3.428714e-01  2.401529e-01  2.184305e-01 -1.499901e+00
## [351]  2.021019e-01 -2.488815e-01 -7.509781e-01 -8.363662e-01 -1.288511e+01
## [356] -2.197827e-01 -7.535619e-01  1.908261e-01 -3.920393e-01  1.810319e+00
## [361] -1.816025e+00 -9.222956e-01  1.516731e+01  1.690356e+00  1.600854e+01
## [366]  7.147443e-01 -8.686325e+00 -2.660053e+01  6.938625e-01 -1.040212e+00
## [371] -3.269061e+00  4.830564e+00  2.774580e+00 -7.363586e-02 -2.084598e+00
## [376]  5.791403e+01  2.418838e-01 -8.111007e+00  9.060320e-01  1.742068e+00
## [381] -3.546489e+00 -1.276269e+00 -8.772834e+00  1.127863e+00 -2.345226e-01
## [386] -1.988449e+01 -1.041618e-01  2.023760e+00  3.567564e-01  1.118162e-01
## [391] -1.290421e+00 -1.217011e+00  7.331012e-02 -1.421959e+00 -2.733997e+00
```

```
## [396]  1.058396e+00  4.439565e-01  8.875280e-01  1.968801e-01  9.235180e-01
## [401]  1.330659e-01  1.662075e+00 -1.511511e+00 -8.223014e+00 -1.093630e-03
## [406]  2.431992e+00 -1.970583e-01 -3.744018e+00 -3.517360e+01  3.475620e-01
## [411] -4.092026e-01  1.355268e+00 -5.652184e-01 -2.309283e-01 -8.704720e-01
## [416] -7.424795e-02 -6.791371e-02 -3.331161e-01 -8.438561e+01  1.779756e+00
## [421] -1.155634e-01  3.501846e-02 -1.770738e+00 -1.107153e+00  6.602761e-02
## [426]  4.223258e-01  1.154973e+01 -8.746445e-01 -6.055103e-02 -1.505984e+00
## [431] -9.936061e-01  2.127554e+00 -2.346772e-01 -9.298408e-01  1.902617e+00
## [436]  3.773398e-01  1.302170e+00  3.598100e-01 -9.992947e-01 -1.268538e+00
## [441]  4.240525e-01  4.711589e+00 -7.108081e-01  9.325497e-01 -2.000465e-02
## [446]  3.403447e+00 -4.296508e+00  1.137424e+00  6.173490e-01  8.675948e-01
## [451] -5.230468e-01 -4.157289e-01  1.788463e-01 -1.479471e+00  1.975743e+00
## [456]  6.685597e+00 -3.330099e+00  1.625145e-01 -3.176618e+00  7.140672e+00
## [461]  2.142413e+00  5.675068e-02 -1.196080e+01 -5.291234e-01  1.053185e-01
## [466] -4.188588e+00 -8.171266e-02  4.847575e-02 -6.663371e+01 -4.276320e+02
## [471]  1.232391e+00 -4.976943e+00 -4.642713e-01 -1.468454e-02 -1.072902e-01
## [476] -2.954732e-01  8.989705e-02 -1.898635e+00  1.473455e+00 -2.014689e+00
## [481] -3.500193e-01 -4.510191e+00  6.248391e+00 -1.766129e+00  4.269745e-01
## [486] -8.737509e+00 -1.334660e-02  1.205754e+00 -1.712214e+00  4.987825e+01
## [491] -5.028575e-01  2.986800e+00 -2.606368e-01 -2.722192e-02  1.066494e+00
## [496]  1.199381e+01 -1.720641e+00  4.653441e-01 -3.827293e+00  3.399149e+00
## [501]  1.873975e+00 -1.399686e+00  5.907859e+00  2.016196e+00 -2.563345e+00
## [506] -2.242781e+00 -1.319916e-01  2.467303e+00  5.262506e+00 -5.800347e-01
## [511] -2.199437e-02 -8.446258e-01 -1.104921e-02 -8.033579e-01  7.530370e-01
## [516]  5.429941e-01  4.504179e+00  4.461714e-01  1.147816e+00  1.844855e-01
## [521]  7.752949e-01 -9.706386e-02 -2.980546e-01 -4.303663e+00  5.723191e-01
## [526] -1.483306e+00 -8.290193e-02 -1.351462e+00  7.756410e+00 -3.475681e+00
## [531] -3.651636e+00 -4.171079e-02 -3.897448e-01 -1.622297e+00  4.876466e+00
## [536] -1.980416e+00  3.744707e-02 -6.905780e-01  1.269435e+00 -3.954298e+00
## [541] -5.732165e+00  2.879774e+00 -2.313302e-02 -6.122818e+00 -3.122596e-01
## [546]  8.820938e+00  7.994603e-01  4.146284e-01  5.707389e+00  1.371111e+01
## [551]  1.511290e+00  1.207435e+00
```

```r
df(df$Confirmed, df1=1, df2=1, ncp=1, log = FALSE)
```

```
##  [1]          Inf          Inf          Inf 1.537081e-01 1.537081e-01
##  [6]          Inf          Inf          Inf          Inf          Inf
## [11]          Inf          Inf          Inf          Inf          Inf
## [16]          Inf          Inf          Inf          Inf          Inf
## [21]          Inf          Inf          Inf          Inf          Inf
## [26]          Inf          Inf          Inf          Inf          Inf
## [31]          Inf          Inf          Inf          Inf          Inf
## [36]          Inf          Inf          Inf          Inf 2.420505e-02
## [41] 1.672845e-02          Inf 8.357581e-02 5.486655e-02          Inf
## [46] 8.357581e-02 5.486655e-02          Inf          Inf 1.537081e-01
## [51] 9.719932e-03 9.719932e-03 7.145849e-03 2.950962e-03 7.863476e-03
## [56] 1.432237e-02 5.130449e-03 1.826536e-03 2.420505e-02 4.771490e-03
## [61] 2.433874e-03 1.989426e-02 3.681156e-03 4.452529e-03 1.432237e-02
## [66] 1.094167e-02 1.672845e-02 8.709880e-03 1.672845e-02 1.432237e-02
## [71] 9.719932e-03 1.989426e-02 1.244293e-02 8.357581e-02 5.486655e-02
## [76] 1.672845e-02 1.537081e-01 1.989426e-02 1.537081e-01 3.961188e-02
## [81] 8.357581e-02 2.420505e-02 5.130449e-03 1.094167e-02 1.244293e-02
## [86] 5.486655e-02 1.989426e-02 1.094167e-02 8.709880e-03 3.961188e-02
## [91] 1.244293e-02 8.357581e-02          Inf 8.357581e-02          Inf
## [96]          Inf 5.486655e-02          Inf          Inf 1.537081e-01
```

```
## [101] 8.357581e-02 1.989426e-02 1.989426e-02 3.034097e-02 1.244293e-02
## [106] 3.282508e-03 6.531136e-03 1.094167e-02 7.863476e-03 2.805551e-03
## [111] 9.719932e-03 3.681156e-03 3.681156e-03 1.639571e-03 9.264806e-04
## [116] 1.166616e-03 1.308820e-03 8.264740e-04 1.760425e-03 5.816066e-04
## [121] 9.264806e-04 1.021963e-03 9.489160e-04 1.048419e-03 5.716298e-04
## [126] 6.133485e-04 5.011060e-04 3.916413e-04 4.078917e-04 4.135598e-04
## [131] 5.257633e-04 5.257633e-04 8.642136e-04 6.024534e-04 6.604007e-04
## [136] 5.816066e-04 1.135053e-03 6.133485e-04 6.480864e-04 6.997861e-04
## [141] 4.783175e-04 3.576523e-04 3.206571e-04 2.993937e-04 2.834075e-04
## [146] 2.744860e-04 2.454592e-04 3.362727e-04 2.503457e-04 1.693609e-04
## [151] 3.576523e-04 3.403754e-04 3.062137e-04 2.478824e-04 2.274147e-04
## [156] 1.505713e-04 1.242488e-04 1.368108e-04 1.719840e-04 1.030707e-04
## [161] 8.859583e-05 7.417408e-05 5.461793e-05 4.301508e-05 5.108846e-05
## [166] 4.872399e-05 3.095346e-05 2.984443e-05 2.393098e-05 2.087351e-05
## [171] 3.213292e-05 1.974156e-05 2.075550e-05 2.403060e-05 1.389306e-05
## [176] 1.312785e-05 1.764207e-05 1.268455e-05 1.645829e-05 2.495916e-05
## [181] 1.165656e-05 1.711790e-05 4.074565e-05 9.802631e-06 1.224936e-05
## [186] 1.162669e-05 1.556941e-05 1.303714e-05 1.124969e-05 9.938757e-06
## [191] 1.050354e-05 8.686865e-06 1.102770e-05 1.140667e-05 8.714443e-06
## [196] 1.101407e-05 7.516071e-06 7.480199e-06 7.209922e-06 7.767796e-06
## [201] 6.489463e-06 6.307723e-06 4.127032e-06 5.326114e-06 5.265832e-06
## [206] 4.594048e-06 5.579151e-06 1.061780e-05 4.018097e-06 3.774881e-06
## [211] 3.940730e-06 3.626753e-06 3.962934e-06 4.651721e-06 7.767796e-06
## [216] 1.207268e-05 7.640206e-06 7.596006e-06 3.768034e-06 3.399802e-06
## [221] 2.718580e-06 6.949212e-06 2.794364e-06 2.344301e-06 2.400150e-06
## [226] 2.847818e-06 3.001615e-06 2.644896e-06 3.633177e-06 2.551702e-06
## [231] 1.962647e-06 1.620993e-06 1.729504e-06 1.470069e-06 1.445725e-06
## [236] 2.963034e-06 1.755977e-06 1.180347e-06 9.251937e-07 8.926116e-07
## [241] 7.934640e-07 7.243391e-07 1.521862e-06 7.378231e-07 5.608082e-07
## [246] 6.341785e-07 5.223766e-07 6.710716e-07 5.882675e-07 1.299526e-06
## [251] 6.663460e-07 4.260325e-07 1.157987e-06 5.230543e-07 3.651265e-07
## [256] 5.149344e-07 1.018897e-06 5.671542e-07 9.430279e-07 6.768946e-07
## [261] 7.486369e-07 5.435461e-07 6.980224e-07 1.307295e-06 8.695579e-07
## [266] 6.077713e-07 7.189736e-07 5.926267e-07 6.206281e-07 8.219776e-07
## [271] 1.657417e-06 1.154171e-06 5.646401e-07 7.910920e-07 8.603406e-07
## [276] 6.523743e-07 7.902477e-07 1.747711e-06 8.185666e-07 5.921049e-07
## [281] 8.261385e-07 7.941439e-07 7.614585e-07 1.159584e-06 2.159937e-06
## [286] 9.986248e-07 7.932942e-07 1.129253e-06 1.052249e-06 9.180002e-07
## [291] 1.500490e-06 3.296875e-06 1.055520e-06 9.047346e-07 1.074944e-06
## [296] 9.941560e-07 1.061009e-06 1.221688e-06 2.020108e-06 1.166007e-06
## [301] 8.897259e-07 1.179689e-06 1.862594e-06 9.416705e-07 1.097591e-06
## [306] 2.365119e-06 1.180677e-06 9.269517e-07 1.180347e-06 1.076072e-06
## [311] 1.040398e-06 1.409119e-06 2.485340e-06 1.303401e-06 1.366853e-06
## [316] 1.556712e-06 1.471019e-06 1.014021e-06 1.444802e-06 3.302354e-06
## [321] 1.234350e-06 9.565510e-07 1.328261e-06 1.154488e-06 9.320372e-07
## [326] 1.078050e-06 2.322768e-06 9.889845e-07 9.602741e-07 1.249039e-06
## [331] 1.173467e-06 2.220827e-06 1.354336e-06 2.765537e-06 1.030078e-06
## [336] 9.376179e-07 1.235415e-06 1.319490e-06 1.196330e-06 1.491206e-06
## [341] 2.801301e-06 1.105809e-06 9.100450e-07 1.296055e-06 1.261810e-06
## [346] 1.132011e-06 1.518348e-06 2.681963e-06 1.138491e-06 1.000122e-06
## [351] 1.143782e-06 1.103157e-06 1.011215e-06 1.313959e-06 2.403378e-06
## [356] 9.563191e-07 8.270477e-07 9.230040e-07 8.384616e-07 8.013419e-07
## [361] 9.921806e-07 2.387312e-06 9.320372e-07 1.092940e-06 1.061285e-06
## [366] 9.376179e-07 9.344859e-07 1.217515e-06 2.286613e-06 1.076636e-06
```

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## [371] 9.182168e-07 9.761300e-07 1.107288e-06 1.015813e-06 9.826435e-07
## [376] 2.032263e-06 1.235770e-06 1.006147e-06 1.212333e-06 1.173467e-06
## [381] 1.149744e-06 1.485391e-06 3.003176e-06 1.341193e-06 1.359737e-06
## [386] 1.499018e-06 1.538610e-06 1.467225e-06 1.791681e-06 4.470067e-06
## [391] 1.815711e-06 1.768176e-06 2.086370e-06 2.091486e-06 1.992213e-06
## [396] 2.505983e-06 5.450186e-06 2.920794e-06 3.199038e-06 3.476077e-06
## [401] 3.180050e-06 3.154459e-06 4.832190e-06 8.760733e-06 4.172532e-06
## [406] 3.777168e-06 4.720548e-06 6.191222e-06 5.065409e-06 6.129179e-06
## [411] 1.357827e-05 5.318010e-06 4.839098e-06 5.618835e-06 5.261854e-06
## [416] 4.909087e-06 5.726992e-06 1.065635e-05 5.257881e-06 3.821062e-06
## [421] 5.242037e-06 5.963797e-06 4.991684e-06 4.457976e-06 7.625425e-06
## [426] 3.982846e-06 3.403645e-06 3.142634e-06 3.702900e-06 3.631034e-06
## [431] 3.135910e-06 4.064190e-06 2.244642e-06 2.244642e-06 1.619876e-06
## [436] 1.291451e-06 9.544674e-07 7.968733e-07 1.083451e-06 7.142438e-07
## [441] 5.657981e-07 6.352322e-07 4.631798e-07 2.859687e-07 1.886500e-07
## [446] 2.919940e-07 1.698966e-07 1.386851e-07 1.049276e-07 9.699771e-08
## [451] 1.067612e-07 9.688530e-08 1.436942e-07 7.827658e-08 7.103581e-08
## [456] 6.135138e-08 6.486729e-08 6.918123e-08 8.145719e-08 1.109374e-07
## [461] 6.489083e-08 5.416023e-08 5.318558e-08 6.170344e-08 5.412539e-08
## [466] 6.870353e-08 1.021232e-07 6.462999e-08 5.124572e-08 5.827300e-08
## [471] 7.201775e-08 7.877650e-08 9.090650e-08 1.486366e-07 8.389433e-08
## [476] 7.848094e-08 8.740988e-08 9.104899e-08 9.665605e-08 1.121706e-07
## [481] 1.956148e-07 9.045393e-08 9.522984e-08 1.238809e-07 1.395808e-07
## [486] 1.290769e-07 1.658522e-07 3.411321e-07 1.675420e-07 1.688090e-07
## [491] 1.797759e-07 2.250909e-07 2.040215e-07 2.618524e-07 5.177565e-07
## [496] 2.395996e-07 2.256120e-07 2.686340e-07 2.740591e-07 2.860618e-07
## [501] 3.732403e-07 6.861217e-07 3.433908e-07 3.044237e-07 3.342210e-07
## [506] 3.842821e-07 3.352690e-07 3.702164e-07 7.237559e-07 3.283581e-07
## [511] 3.218323e-07 3.505795e-07 3.750842e-07 3.488453e-07 4.086332e-07
## [516] 6.426907e-07 2.950375e-07 2.915452e-07 3.187987e-07 3.498407e-07
## [521] 3.347443e-07 3.496239e-07 6.458115e-07 2.700650e-07 2.388398e-07
## [526] 2.879330e-07 2.946134e-07 2.783303e-07 3.444872e-07 6.757233e-07
## [531] 2.654533e-07 2.379927e-07 2.879017e-07 2.886243e-07 2.267865e-07
## [536] 2.822580e-07 4.701925e-07 2.128016e-07 2.013491e-07 3.206656e-07
## [541] 2.007115e-07 1.844817e-07 2.016085e-07 3.731437e-07 1.413727e-07
## [546] 1.420752e-07 1.419979e-07 1.554492e-07 1.571254e-07 1.559444e-07
## [551] 2.814108e-07 1.277463e-07
```

```r
df(df$Recovered, df1=1, df2=1, ncp=1, log = FALSE)
```

```
##   [1]          Inf          Inf          Inf          Inf          Inf
##   [6]          Inf          Inf          Inf          Inf          Inf
##  [11]          Inf          Inf          Inf          Inf          Inf
##  [16]          Inf          Inf          Inf          Inf          Inf
##  [21]          Inf          Inf          Inf          Inf          Inf
##  [26]          Inf          Inf          Inf          Inf          Inf
##  [31]          Inf          Inf          Inf          Inf          Inf
##  [36]          Inf          Inf          Inf          Inf          Inf
##  [41]          Inf          Inf          Inf          Inf          Inf
##  [46]          Inf          Inf          Inf          Inf          Inf
##  [51]          Inf          Inf          Inf          Inf          Inf
##  [56]          Inf          Inf 5.486655e-02 1.672845e-02 3.961188e-02
##  [61]          Inf 3.961188e-02 8.357581e-02 8.357581e-02 7.863476e-03
##  [66] 1.672845e-02 2.420505e-02 5.486655e-02 9.719932e-03 8.709880e-03
##  [71] 8.709880e-03 3.109384e-03 5.130449e-03 2.051951e-03 5.130449e-03
```

```
##  [76] 8.709880e-03 1.989426e-02 3.109384e-03 1.244293e-02 8.357581e-02
##  [81] 8.709880e-03 4.452529e-03 6.531136e-03 1.537081e-01 1.672845e-02
##  [86] 7.145849e-03 1.989426e-02 3.961188e-02 8.709880e-03 3.961188e-02
##  [91] 1.244293e-02 7.863476e-03 1.432237e-02 1.672845e-02 1.537081e-01
##  [96] 9.489160e-04          Inf 1.989426e-02 3.034097e-02 1.244293e-02
## [101] 1.537081e-01 3.961188e-02          Inf          Inf 1.537081e-01
## [106] 5.486655e-02          Inf 3.961188e-02          Inf          Inf
## [111]          Inf 3.034097e-02 1.672845e-02 8.357581e-02 5.486655e-02
## [116] 3.034097e-02 9.719932e-03 1.244293e-02 1.244293e-02 5.486655e-02
## [121] 1.244293e-02 1.244293e-02 7.145849e-03 5.536800e-03 5.130449e-03
## [126] 3.681156e-03 1.826536e-03 4.167592e-03 1.270657e-03 1.698208e-03
## [131] 1.094167e-02 2.229351e-03 1.048419e-03 9.264806e-04 2.433874e-03
## [136] 1.435590e-03 1.076037e-03 7.282722e-04 9.722718e-04 5.344350e-04
## [141] 5.433479e-04 4.857185e-04 1.048419e-03 5.091071e-04 5.525112e-04
## [146] 9.722718e-04 6.245760e-04 1.166616e-03 8.642136e-04 4.439783e-04
## [151] 1.639571e-03 6.480864e-04 6.997861e-04 3.027717e-04 1.606851e-04
## [156] 1.618786e-04 1.527254e-04 3.244460e-04 2.133665e-04 3.813975e-04
## [161] 4.252979e-04 2.528501e-04 3.864628e-04 2.687951e-04 3.027717e-04
## [166] 2.232470e-04 1.892521e-04 1.680743e-04 1.341334e-04 2.993937e-04
## [171] 1.583415e-04 2.041938e-04 1.204830e-04 1.019491e-04 1.030707e-04
## [176] 5.162008e-05 1.542506e-05 1.367536e-05 2.566764e-05 2.283311e-05
## [181] 2.623575e-05 2.833337e-05 2.091310e-05 1.828827e-05 2.251555e-05
## [186] 2.572352e-05 1.995964e-05 1.424108e-05 1.072112e-05 2.052278e-05
## [191] 1.999638e-05 6.546265e-06 1.537744e-05 2.115326e-05 8.632142e-06
## [196] 1.779244e-05 2.190206e-05 9.870303e-06 2.040805e-05 1.275378e-05
## [201] 1.221692e-05 9.216680e-06 1.094633e-05 1.094633e-05 8.696041e-06
## [206] 1.000801e-05 1.256487e-05 1.066925e-05 8.366948e-06 9.360188e-06
## [211] 4.948303e-06 4.842557e-06 4.430969e-06 6.264939e-06 6.674188e-06
## [216] 4.794491e-06 4.733850e-06 5.399985e-06 3.285961e-06 4.794491e-06
## [221] 4.518982e-06 4.369004e-06 5.787035e-06 4.980780e-06 6.892712e-06
## [226] 9.625903e-06 5.424989e-06 5.819801e-06 4.797898e-06 3.650401e-06
## [231] 4.319891e-06 3.248232e-06 3.235816e-06 3.037856e-06 3.223478e-06
## [236] 2.794364e-06 2.820880e-06 2.901523e-06 2.608676e-06 2.264978e-06
## [241] 2.570863e-06 2.355713e-06 2.402301e-06 2.325824e-06 2.212356e-06
## [246] 3.092781e-06 1.777256e-06 1.553583e-06 1.377007e-06 1.471970e-06
## [251] 1.323465e-06 9.621447e-07 7.939739e-07 6.444881e-07 7.064752e-07
## [256] 5.519719e-07 6.708147e-07 6.855888e-07 6.765038e-07 7.807280e-07
## [261] 8.358614e-07 6.513950e-07 6.033329e-07 7.208512e-07 7.346745e-07
## [266] 8.226987e-07 7.032681e-07 9.723041e-07 8.944750e-07 6.955603e-07
## [271] 7.766128e-07 7.919378e-07 6.940628e-07 5.965118e-07 6.718431e-07
## [276] 7.414492e-07 5.926267e-07 7.764490e-07 5.634859e-07 6.259670e-07
## [281] 6.887966e-07 6.685103e-07 7.744872e-07 8.201794e-07 1.005391e-06
## [286] 8.488083e-07 7.534415e-07 9.720658e-07 9.528519e-07 8.310680e-07
## [291] 8.514760e-07 8.743282e-07 8.638513e-07 7.833808e-07 8.189246e-07
## [296] 9.091919e-07 8.448327e-07 9.468916e-07 1.164395e-06 1.259239e-06
## [301] 1.061561e-06 1.008676e-06 1.518850e-06 1.214401e-06 1.036939e-06
## [306] 9.875152e-07 9.644915e-07 1.020445e-06 1.113234e-06 1.141910e-06
## [311] 1.047913e-06 1.234705e-06 1.441580e-06 1.427905e-06 1.468646e-06
## [316] 1.378712e-06 1.422046e-06 1.216822e-06 1.220294e-06 1.550984e-06
## [321] 1.290304e-06 1.073256e-06 1.327860e-06 1.443420e-06 1.421597e-06
## [326] 1.556189e-06 1.544261e-06 1.293750e-06 1.395516e-06 1.398569e-06
## [331] 1.538098e-06 2.000117e-06 2.282654e-06 1.726396e-06 1.304567e-06
## [336] 1.079184e-06 1.180347e-06 1.273305e-06 1.321873e-06 1.458749e-06
## [341] 1.260707e-06 1.347327e-06 1.273679e-06 1.098759e-06 1.197679e-06
```

```
## [346] 1.164717e-06 1.462977e-06 1.894016e-06 1.667322e-06 1.255945e-06
## [351] 1.628846e-06 1.489749e-06 1.311601e-06 1.589661e-06 1.894741e-06
## [356] 1.652213e-06 7.363210e-07 9.464357e-07 9.746924e-07 1.211645e-06
## [361] 1.250488e-06 1.108473e-06 1.209241e-06 1.313566e-06 1.112041e-06
## [366] 9.091919e-07 7.890682e-07 1.072694e-06 1.235415e-06 1.067939e-06
## [371] 9.130415e-07 9.214763e-07 8.574331e-07 9.581769e-07 1.014276e-06
## [376] 1.011470e-06 8.930251e-07 1.068496e-06 1.083451e-06 1.194985e-06
## [381] 1.043876e-06 1.447574e-06 1.287635e-06 1.159903e-06 1.385135e-06
## [386] 1.243272e-06 1.375731e-06 1.042268e-06 1.624350e-06 1.301461e-06
## [391] 1.389013e-06 1.030603e-06 1.466279e-06 1.745181e-06 1.467225e-06
## [396] 1.631101e-06 2.270844e-06 2.235065e-06 1.817738e-06 1.736373e-06
## [401] 2.119999e-06 2.230302e-06 1.812342e-06 2.788834e-06 1.601633e-06
## [406] 1.714060e-06 2.023337e-06 2.370372e-06 2.503675e-06 2.524573e-06
## [411] 2.282654e-06 3.003176e-06 3.114221e-06 4.767381e-06 5.338309e-06
## [416] 4.473098e-06 4.354463e-06 6.264939e-06 4.594048e-06 4.973532e-06
## [421] 5.773086e-06 5.539932e-06 4.887914e-06 5.829220e-06 5.627718e-06
## [426] 5.416633e-06 5.050519e-06 5.915144e-06 4.252105e-06 6.874049e-06
## [431] 4.590879e-06 5.768449e-06 5.623274e-06 5.379295e-06 4.491358e-06
## [436] 3.777168e-06 3.540818e-06 4.061606e-06 3.779457e-06 2.889769e-06
## [441] 3.424915e-06 3.315199e-06 1.992213e-06 2.106094e-06 1.508384e-06
## [446] 1.647036e-06 1.924843e-06 1.162467e-06 9.151920e-07 1.091783e-06
## [451] 7.832146e-07 6.357015e-07 6.573077e-07 1.862578e-07 2.410381e-07
## [456] 1.516663e-07 2.010213e-07 2.413182e-07 2.237043e-07 1.706543e-07
## [461] 1.100667e-07 1.325021e-07 1.040189e-07 1.068994e-07 1.022962e-07
## [466] 9.270763e-08 8.441096e-08 7.771118e-08 7.231142e-08 7.511696e-08
## [471] 8.396666e-08 9.212259e-08 7.327497e-08 1.479494e-08 4.728666e-08
## [476] 4.369025e-08 4.979739e-08 5.599388e-08 4.811081e-08 6.456246e-08
## [481] 6.802411e-08 7.625337e-08 6.950571e-08 8.720389e-08 1.093009e-07
## [486] 9.879987e-08 9.417330e-08 9.488862e-08 1.242586e-07 9.088814e-08
## [491] 1.074611e-07 1.119105e-07 1.251448e-07 1.483557e-07 1.433895e-07
## [496] 1.643013e-07 1.616538e-07 1.928007e-07 2.445784e-07 1.899751e-07
## [501] 1.950400e-07 2.148064e-07 2.954953e-07 2.368105e-07 2.929596e-07
## [506] 3.475969e-07 3.087759e-07 3.346234e-07 2.935415e-07 3.662943e-07
## [511] 2.907466e-07 3.788675e-07 4.002913e-07 3.966268e-07 3.390216e-07
## [516] 3.759141e-07 4.462601e-07 3.626712e-07 3.742089e-07 4.488764e-07
## [521] 3.323801e-07 3.748407e-07 3.850444e-07 4.174436e-07 3.710762e-07
## [526] 3.816089e-07 4.353568e-07 3.599702e-07 3.328987e-07 3.799601e-07
## [531] 4.431540e-07 3.149000e-07 3.382409e-07 4.206083e-07 3.069529e-07
## [536] 2.822580e-07 3.066392e-07 3.517145e-07 2.770315e-07 2.982006e-07
## [541] 3.996947e-07 2.409915e-07 2.471815e-07 2.555568e-07 2.995019e-07
## [546] 1.966068e-07 2.166280e-07 2.624155e-07 2.124799e-07 1.960933e-07
## [551] 2.316100e-07 2.382440e-07
```

```r
df(df$Deceased, df1=1, df2=1, ncp=1, log = FALSE)
```

```
##  [1]       Inf       Inf       Inf       Inf       Inf
##  [6]       Inf       Inf       Inf       Inf       Inf
## [11]       Inf       Inf       Inf       Inf       Inf
## [16]       Inf       Inf       Inf       Inf       Inf
## [21]       Inf       Inf       Inf       Inf       Inf
## [26]       Inf       Inf       Inf       Inf       Inf
## [31]       Inf       Inf       Inf       Inf       Inf
## [36]       Inf       Inf       Inf       Inf       Inf
## [41]       Inf       Inf       Inf       Inf       Inf
## [46]       Inf       Inf       Inf       Inf       Inf
```

```
## [51]          Inf          Inf          Inf          Inf          Inf
## [56]          Inf          Inf          Inf 0.1537081308          Inf
## [61]          Inf 0.1537081308          Inf          Inf          Inf
## [66]          Inf          Inf          Inf          Inf          Inf
## [71]          Inf          Inf          Inf          Inf          Inf
## [76]          Inf          Inf          Inf          Inf          Inf
## [81]          Inf          Inf          Inf          Inf          Inf
## [86] 0.1537081308          Inf          Inf          Inf          Inf
## [91]          Inf          Inf          Inf          Inf          Inf
## [96]          Inf          Inf          Inf          Inf          Inf
## [101]          Inf          Inf          Inf          Inf          Inf
## [106]          Inf          Inf          Inf          Inf          Inf
## [111]          Inf          Inf          Inf 0.1537081308          Inf
## [116] 0.1537081308 0.1537081308          Inf          Inf 0.1537081308
## [121] 0.1537081308 0.1537081308 0.1537081308          Inf 0.1537081308
## [126]          Inf 0.0548665457          Inf 0.1537081308          Inf
## [131] 0.1537081308          Inf 0.1537081308 0.1537081308 0.1537081308
## [136]          Inf          Inf 0.1537081308          Inf          Inf
## [141] 0.1537081308          Inf          Inf          Inf          Inf
## [146] 0.1537081308          Inf          Inf          Inf          Inf
## [151]          Inf 0.1537081308 0.1537081308 0.1537081308          Inf
## [156]          Inf          Inf          Inf 0.0835758108          Inf
## [161]          Inf          Inf          Inf 0.0835758108 0.0835758108
## [166] 0.0835758108 0.1537081308 0.1537081308 0.0835758108 0.1537081308
## [171] 0.0835758108 0.0835758108 0.1537081308 0.1537081308 0.1537081308
## [176] 0.0303409692 0.0396118815 0.0303409692 0.0835758108 0.0835758108
## [181] 0.0396118815 0.1537081308 0.0835758108 0.0548665457 0.0167284530
## [186] 0.1537081308 0.0835758108 0.0548665457 0.0198942608 0.0548665457
## [191] 0.0303409692 0.0396118815 0.0835758108 0.0198942608 0.0303409692
## [196] 0.0242050484 0.0548665457 0.0124429326 0.0198942608 0.0124429326
## [201] 0.0087098799 0.0242050484 0.0198942608 0.0143223656 0.0097199322
## [206] 0.0071458487 0.0303409692 0.0109416693 0.0124429326 0.0087098799
## [211] 0.0124429326 0.0198942608 0.0242050484 0.0198942608 0.0198942608
## [216] 0.0396118815 0.0198942608 0.0124429326 0.0109416693 0.0109416693
## [221] 0.0124429326 0.0097199322 0.0087098799 0.0097199322 0.0097199322
## [226] 0.0078634756 0.0071458487 0.0078634756 0.0071458487 0.0097199322
## [231] 0.0078634756 0.0143223656 0.0097199322 0.0055367997 0.0065311361
## [236] 0.0055367997 0.0051304490 0.0047714902 0.0044525292 0.0041675918
## [241] 0.0044525292 0.0044525292 0.0047714902 0.0041675918 0.0039118045
## [246] 0.0028055511 0.0047714902 0.0041675918 0.0039118045 0.0039118045
## [251] 0.0034723179 0.0041675918 0.0036811560 0.0034723179 0.0039118045
## [256] 0.0034723179 0.0041675918 0.0044525292 0.0047714902 0.0039118045
## [261] 0.0036811560 0.0032825078 0.0041675918 0.0044525292 0.0036811560
## [266] 0.0032825078 0.0039118045 0.0032825078 0.0034723179 0.0032825078
## [271] 0.0047714902 0.0036811560 0.0031093837 0.0032825078 0.0029509617
## [276] 0.0031093837 0.0029509617 0.0044525292 0.0032825078 0.0029509617
## [281] 0.0032825078 0.0031093837 0.0029509617 0.0036811560 0.0041675918
## [286] 0.0029509617 0.0028055511 0.0034723179 0.0032825078 0.0032825078
## [291] 0.0044525292 0.0051304490 0.0031093837 0.0029509617 0.0032825078
## [296] 0.0029509617 0.0034723179 0.0031093837 0.0041675918 0.0036811560
## [301] 0.0032825078 0.0031093837 0.0039118045 0.0034723179 0.0031093837
## [306] 0.0044525292 0.0032825078 0.0029509617 0.0025481707 0.0028055511
## [311] 0.0024338736 0.0029509617 0.0039118045 0.0025481707 0.0021375870
## [316] 0.0032825078 0.0028055511 0.0024338736 0.0028055511 0.0036811560
```

```
## [321] 0.0023278734 0.0031093837 0.0031093837 0.0039118045 0.0028055511
## [326] 0.0026717033 0.0031093837 0.0031093837 0.0041675918 0.0041675918
## [331] 0.0065311361 0.0044525292 0.0034723179 0.0078634756 0.0036811560
## [336] 0.0029509617 0.0026717033 0.0039118045 0.0044525292 0.0034723179
## [341] 0.0051304490 0.0036811560 0.0034723179 0.0034723179 0.0039118045
## [346] 0.0041675918 0.0039118045 0.0047714902 0.0034723179 0.0032825078
## [351] 0.0051304490 0.0039118045 0.0031093837 0.0044525292 0.0059997923
## [356] 0.0032825078 0.0055367997 0.0044525292 0.0051304490 0.0039118045
## [361] 0.0047714902 0.0059997923 0.0051304490 0.0047714902 0.0051304490
## [366] 0.0041675918 0.0055367997 0.0044525292 0.0059997923 0.0065311361
## [371] 0.0047714902 0.0059997923 0.0051304490 0.0065311361 0.0051304490
## [376] 0.0065311361 0.0051304490 0.0055367997 0.0065311361 0.0055367997
## [381] 0.0065311361 0.0071458487 0.0087098799 0.0055367997 0.0065311361
## [386] 0.0078634756 0.0071458487 0.0087098799 0.0071458487 0.0065311361
## [391] 0.0078634756 0.0059997923 0.0078634756 0.0078634756 0.0055367997
## [396] 0.0071458487 0.0087098799 0.0065311361 0.0071458487 0.0078634756
## [401] 0.0065311361 0.0065311361 0.0087098799 0.0097199322 0.0065311361
## [406] 0.0078634756 0.0087098799 0.0078634756 0.0097199322 0.0071458487
## [411] 0.0109416693 0.0071458487 0.0087098799 0.0071458487 0.0059997923
## [416] 0.0071458487 0.0087098799 0.0097199322 0.0124429326 0.0124429326
## [421] 0.0097199322 0.0078634756 0.0078634756 0.0097199322 0.0109416693
## [426] 0.0065311361 0.0071458487 0.0109416693 0.0078634756 0.0097199322
## [431] 0.0124429326 0.0097199322 0.0078634756 0.0065311361 0.0055367997
## [436] 0.0041675918 0.0059997923 0.0065311361 0.0109416693 0.0047714902
## [441] 0.0041675918 0.0047714902 0.0044525292 0.0031093837 0.0034723179
## [446] 0.0044525292 0.0029509617 0.0041675918 0.0029509617 0.0031093837
## [451] 0.0034723179 0.0026717033 0.0029509617 0.0024338736 0.0016982077
## [456] 0.0013489329 0.0013088201 0.0013489329 0.0013088201 0.0014824609
## [461] 0.0010484194 0.0010219633 0.0009049156 0.0011350533 0.0008841744
## [466] 0.0008086219 0.0008642136 0.0006480864 0.0004933122 0.0004783175
## [471] 0.0005091071 0.0004857185 0.0005433479 0.0005619350 0.0004783175
## [476] 0.0003864628 0.0003169413 0.0002716157 0.0001973187 0.0001788466
## [481] 0.0001680743 0.0001956601 0.0002478824 0.0001892521 0.0001706641
## [486] 0.0001655493 0.0001817205 0.0002007072 0.0001706641 0.0001484673
## [491] 0.0002430753 0.0002928230 0.0001527254 0.0001350161 0.0001505713
## [496] 0.0003322517 0.0002361500 0.0001706641 0.0002024380 0.0002059752
## [501] 0.0001560544 0.0002253148 0.0002152836 0.0002579860 0.0005525112
## [506] 0.0005344350 0.0003715927 0.0003864628 0.0005011060 0.0002744860
## [511] 0.0002503457 0.0002896273 0.0003576523 0.0003576523 0.0009264806
## [516] 0.0003969364 0.0004313768 0.0002716157 0.0003322517 0.0002606195
## [521] 0.0002928230 0.0006862320 0.0004439783 0.0002716157 0.0002553965
## [526] 0.0002716157 0.0003097215 0.0004023519 0.0004783175 0.0004572054
## [531] 0.0003322517 0.0003169413 0.0005619350 0.0003097215 0.0003764419
## [536] 0.0006245760 0.0010219633 0.0004313768 0.0004252979 0.0003403754
## [541] 0.0003027717 0.0004711026 0.0008449928 0.0002928230 0.0002361500
## [546] 0.0003062137 0.0003169413 0.0003668467 0.0006361502 0.0010760369
## [551] 0.0003576523 0.0002553965
```

```r
pf(df$Confirmed, df1=1, df2=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.3645399 0.3645399 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
```

```
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.6527350 0.6929021 0.0000000
##  [43] 0.4769607 0.5444787 0.0000000 0.4769607 0.5444787 0.0000000 0.0000000
##  [50] 0.3645399 0.7436977 0.7436977 0.7686669 0.8277198 0.7611718 0.7083756
##  [57] 0.7928494 0.8531764 0.6527350 0.7977968 0.8384341 0.6746670 0.8145451
##  [64] 0.8024057 0.7083756 0.7333869 0.6929021 0.7528972 0.6929021 0.7083756
##  [71] 0.7436977 0.6746670 0.7217215 0.4769607 0.5444787 0.6929021 0.3645399
##  [78] 0.6746670 0.3645399 0.5910231 0.4769607 0.6527350 0.7928494 0.7333869
##  [85] 0.7217215 0.5444787 0.6746670 0.7333869 0.7528972 0.5910231 0.7217215
##  [92] 0.4769607 0.0000000 0.4769607 0.0000000 0.0000000 0.5444787 0.0000000
##  [99] 0.0000000 0.3645399 0.4769607 0.6746670 0.6746670 0.6256549 0.7217215
## [106] 0.8214961 0.7754978 0.7333869 0.7611718 0.8305970 0.7436977 0.8145451
## [113] 0.8145451 0.8583671 0.8829058 0.8735559 0.8686141 0.8872802 0.8549695
## [120] 0.8997385 0.8829058 0.8790141 0.8819682 0.8779790 0.9003151 0.8979468
## [127] 0.9045957 0.9121205 0.9109214 0.9105107 0.9030559 0.9030559 0.8855900
## [134] 0.8985546 0.8954012 0.8997385 0.8747067 0.8979468 0.8960554 0.8933619
## [141] 0.9060644 0.9147400 0.9177873 0.9196463 0.9211027 0.9219394 0.9247941
## [148] 0.9164739 0.9242983 0.9335447 0.9147400 0.9161356 0.9190407 0.9245475
## [155] 0.9266841 0.9360992 0.9400637 0.9381083 0.9332033 0.9436833 0.9464536
## [162] 0.9495327 0.9544274 0.9579145 0.9554310 0.9561294 0.9622866 0.9627425
## [169] 0.9653865 0.9669282 0.9618136 0.9675372 0.9669907 0.9653385 0.9711248
## [176] 0.9716650 0.9687314 0.9719876 0.9694470 0.9648977 0.9727657 0.9690442
## [183] 0.9586680 0.9742937 0.9723117 0.9727890 0.9700072 0.9717304 0.9730864
## [190] 0.9741752 0.9736950 0.9753085 0.9732646 0.9729617 0.9752824 0.9732756
## [197] 0.9764718 0.9765093 0.9767957 0.9762120 0.9775958 0.9778070 0.9807334
## [204] 0.9790237 0.9791031 0.9800325 0.9786966 0.9736000 0.9809044 0.9812978
## [211] 0.9810278 0.9815457 0.9809922 0.9799493 0.9762120 0.9724454 0.9763429
## [218] 0.9763887 0.9813091 0.9819389 0.9832362 0.9770788 0.9830818 0.9840438
## [225] 0.9839181 0.9829746 0.9826735 0.9833890 0.9815348 0.9835865 0.9849614
## [232] 0.9858902 0.9855822 0.9863425 0.9864183 0.9827481 0.9855090 0.9873061
## [239] 0.9882959 0.9884350 0.9888801 0.9892129 0.9861839 0.9891463 0.9900948
## [246] 0.9896804 0.9903264 0.9894840 0.9899357 0.9868925 0.9895088 0.9909620
## [253] 0.9873868 0.9903222 0.9914150 0.9903726 0.9879134 0.9900576 0.9882212
## [260] 0.9894537 0.9890936 0.9901975 0.9893451 0.9868664 0.9885354 0.9898257
## [267] 0.9892396 0.9899109 0.9897544 0.9887484 0.9857853 0.9874006 0.9900723
## [274] 0.9888912 0.9885761 0.9895826 0.9888951 0.9855318 0.9887640 0.9899139
## [281] 0.9887295 0.9888769 0.9890317 0.9873810 0.9844735 0.9879941 0.9888809
## [288] 0.9874920 0.9877830 0.9883264 0.9862489 0.9821231 0.9877703 0.9883829
## [295] 0.9876958 0.9880121 0.9877492 0.9871596 0.9848161 0.9873577 0.9884475
## [302] 0.9873084 0.9852215 0.9882269 0.9876100 0.9839967 0.9873049 0.9882885
## [309] 0.9873061 0.9876915 0.9878290 0.9865339 0.9837300 0.9868795 0.9866699
## [316] 0.9860793 0.9863395 0.9879328 0.9864212 0.9821132 0.9871154 0.9881652
## [323] 0.9867966 0.9873995 0.9882672 0.9876839 0.9840928 0.9880329 0.9881498
## [330] 0.9870645 0.9873308 0.9843290 0.9867107 0.9831402 0.9878694 0.9882438
## [337] 0.9871117 0.9868257 0.9872490 0.9862773 0.9830678 0.9875791 0.9883602
## [344] 0.9869042 0.9870205 0.9874818 0.9861946 0.9833118 0.9874579 0.9879881
## [351] 0.9874385 0.9875891 0.9879439 0.9868441 0.9839109 0.9881661 0.9887254
## [358] 0.9883052 0.9886737 0.9888434 0.9880200 0.9839468 0.9882672 0.9876275
## [365] 0.9877481 0.9882438 0.9882569 0.9871742 0.9841757 0.9876893 0.9883254
## [372] 0.9880850 0.9875736 0.9879257 0.9880585 0.9847857 0.9871104 0.9879641
## [379] 0.9871924 0.9873308 0.9874168 0.9862952 0.9826705 0.9867539 0.9866931
## [386] 0.9862534 0.9861334 0.9863513 0.9854114 0.9802137 0.9853465 0.9854755
## [393] 0.9846518 0.9846393 0.9848863 0.9836851 0.9788621 0.9828304 0.9823017
## [400] 0.9818049 0.9823368 0.9823843 0.9796933 0.9752388 0.9806629 0.9812940
## [407] 0.9798509 0.9779445 0.9793717 0.9780184 0.9713446 0.9790343 0.9796836
```

```
## [414] 0.9786462 0.9791084 0.9795861 0.9785101 0.9735681 0.9791136 0.9812218
## [421] 0.9791346 0.9782179 0.9794722 0.9802316 0.9763582 0.9809604 0.9819321
## [428] 0.9824063 0.9814174 0.9815384 0.9824189 0.9808317 0.9842732 0.9842732
## [435] 0.9858935 0.9869197 0.9881738 0.9888642 0.9876634 0.9892632 0.9900655
## [442] 0.9896747 0.9907066 0.9920866 0.9931112 0.9920314 0.9933475 0.9937827
## [449] 0.9943347 0.9944812 0.9943019 0.9944833 0.9937087 0.9948619 0.9950255
## [456] 0.9952627 0.9951738 0.9950691 0.9947932 0.9942285 0.9951733 0.9954555
## [463] 0.9954829 0.9952536 0.9954565 0.9950805 0.9943856 0.9951797 0.9955385
## [470] 0.9953433 0.9950027 0.9948510 0.9945992 0.9936374 0.9947418 0.9948574
## [477] 0.9946694 0.9945964 0.9944877 0.9942072 0.9930274 0.9946082 0.9945149
## [484] 0.9940123 0.9937693 0.9939297 0.9934007 0.9916073 0.9933783 0.9933617
## [491] 0.9932209 0.9926935 0.9929289 0.9923156 0.9903550 0.9925397 0.9926878
## [498] 0.9922498 0.9921980 0.9920857 0.9913519 0.9894060 0.9915889 0.9919199
## [505] 0.9916644 0.9912674 0.9916557 0.9913753 0.9892158 0.9917134 0.9917687
## [512] 0.9915306 0.9913377 0.9915446 0.9910867 0.9896344 0.9920038 0.9920355
## [519] 0.9917946 0.9915365 0.9916601 0.9915383 0.9896177 0.9922361 0.9925476
## [526] 0.9920685 0.9920076 0.9921577 0.9915799 0.9894598 0.9922805 0.9925564
## [533] 0.9920688 0.9920621 0.9926752 0.9921209 0.9906599 0.9928289 0.9929600
## [540] 0.9917786 0.9929674 0.9931623 0.9929569 0.9913526 0.9937428 0.9937324
## [547] 0.9937336 0.9935416 0.9935185 0.9935348 0.9921288 0.9939507
```

```r
pf(df$Recovered, df1=1, df2=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.5444787 0.6929021 0.5910231 0.0000000 0.5910231 0.4769607
##  [64] 0.4769607 0.7611718 0.6929021 0.6527350 0.5444787 0.7436977 0.7528972
##  [71] 0.7528972 0.8246907 0.7928494 0.8473696 0.7928494 0.7528972 0.6746670
##  [78] 0.8246907 0.7217215 0.4769607 0.7528972 0.8024057 0.7754978 0.3645399
##  [85] 0.6929021 0.7686669 0.6746670 0.5910231 0.7528972 0.5910231 0.7217215
##  [92] 0.7611718 0.7083756 0.6929021 0.3645399 0.8819682 0.0000000 0.6746670
##  [99] 0.6256549 0.7217215 0.3645399 0.5910231 0.0000000 0.0000000 0.3645399
## [106] 0.5444787 0.0000000 0.5910231 0.0000000 0.0000000 0.0000000 0.6256549
## [113] 0.6929021 0.4769607 0.5444787 0.6256549 0.7436977 0.7217215 0.7217215
## [120] 0.5444787 0.7217215 0.7217215 0.7686669 0.7875201 0.7928494 0.8145451
## [127] 0.8531764 0.8067131 0.8699037 0.8566985 0.7333869 0.8430924 0.8779790
## [134] 0.8829058 0.8384341 0.8645024 0.8769169 0.8919341 0.8810076 0.9025258
## [141] 0.9019870 0.9055824 0.8779790 0.9040906 0.9014390 0.8810076 0.8973278
## [148] 0.8735559 0.8855900 0.9083684 0.8583671 0.8960554 0.8933619 0.9193452
## [155] 0.9346994 0.9345381 0.9357959 0.9174648 0.9282260 0.9128934 0.9096720
## [162] 0.9240468 0.9125095 0.9224826 0.9193452 0.9271347 0.9310387 0.9337134
## [169] 0.9385147 0.9196463 0.9350184 0.9292696 0.9406755 0.9438883 0.9436833
## [176] 0.9552769 0.9701002 0.9712764 0.9645687 0.9659241 0.9643092 0.9633822
## [183] 0.9669073 0.9683542 0.9660828 0.9645430 0.9674181 0.9708857 0.9735146
## [190] 0.9671145 0.9673981 0.9775307 0.9701310 0.9667811 0.9753605 0.9686428
## [197] 0.9663937 0.9742347 0.9671759 0.9719367 0.9723361 0.9748164 0.9733305
## [204] 0.9733305 0.9752999 0.9741154 0.9720759 0.9735574 0.9756155 0.9746864
## [211] 0.9795319 0.9796787 0.9802716 0.9778573 0.9773852 0.9797462 0.9798320
## [218] 0.9789272 0.9821428 0.9797462 0.9801418 0.9803640 0.9784353 0.9794872
```

```
## [225] 0.9771411 0.9744491 0.9788947 0.9783946 0.9797414 0.9815056 0.9804378
## [232] 0.9822114 0.9822341 0.9826041 0.9822567 0.9830818 0.9830285 0.9828683
## [239] 0.9834652 0.9842258 0.9835455 0.9840179 0.9839133 0.9840858 0.9843489
## [246] 0.9824998 0.9854507 0.9860886 0.9866370 0.9863366 0.9868125 0.9881422
## [253] 0.9888777 0.9896248 0.9893023 0.9901471 0.9894854 0.9894088 0.9894557
## [260] 0.9889399 0.9886855 0.9895878 0.9898505 0.9892302 0.9891618 0.9887452
## [267] 0.9893185 0.9881006 0.9884269 0.9893577 0.9889594 0.9888872 0.9893653
## [274] 0.9898889 0.9894800 0.9891286 0.9899109 0.9889601 0.9900790 0.9897251
## [281] 0.9893923 0.9894974 0.9889695 0.9887567 0.9879671 0.9886273 0.9890703
## [288] 0.9881015 0.9881805 0.9887071 0.9886154 0.9885145 0.9885605 0.9889274
## [295] 0.9887624 0.9883638 0.9886451 0.9882051 0.9873635 0.9870294 0.9877470
## [302] 0.9879540 0.9861931 0.9871852 0.9878425 0.9880388 0.9881325 0.9879073
## [309] 0.9875514 0.9874454 0.9877998 0.9871141 0.9864313 0.9864743 0.9863469
## [316] 0.9866315 0.9864929 0.9871767 0.9871645 0.9860964 0.9869236 0.9877022
## [323] 0.9867979 0.9864255 0.9864943 0.9860808 0.9861165 0.9869119 0.9865774
## [330] 0.9865676 0.9861350 0.9848663 0.9841849 0.9855908 0.9868755 0.9876796
## [337] 0.9873061 0.9869812 0.9868178 0.9863776 0.9870243 0.9867337 0.9869800
## [344] 0.9876056 0.9872443 0.9873624 0.9863645 0.9851388 0.9857571 0.9870407
## [351] 0.9858675 0.9862818 0.9868520 0.9859817 0.9851369 0.9858002 0.9891537
## [358] 0.9882070 0.9880908 0.9871949 0.9870595 0.9875692 0.9872033 0.9868454
## [365] 0.9875558 0.9883638 0.9889007 0.9877044 0.9871117 0.9877226 0.9883474
## [372] 0.9883116 0.9885889 0.9881585 0.9879317 0.9879429 0.9884332 0.9877204
## [379] 0.9876634 0.9872538 0.9878155 0.9864125 0.9869326 0.9873798 0.9866107
## [386] 0.9870844 0.9866411 0.9878217 0.9858805 0.9868860 0.9865983 0.9878673
## [393] 0.9863542 0.9855387 0.9863513 0.9858610 0.9842122 0.9842956 0.9853411
## [400] 0.9855631 0.9845698 0.9843067 0.9853556 0.9830930 0.9859466 0.9856252
## [407] 0.9848080 0.9839848 0.9836901 0.9836448 0.9841849 0.9826705 0.9824595
## [414] 0.9797844 0.9790077 0.9802093 0.9803858 0.9778573 0.9800325 0.9794972
## [421] 0.9784526 0.9787467 0.9796155 0.9783830 0.9786350 0.9789055 0.9793919
## [428] 0.9782773 0.9805407 0.9771617 0.9800371 0.9784584 0.9786406 0.9789541
## [435] 0.9801824 0.9812940 0.9816926 0.9808358 0.9812902 0.9828914 0.9818946
## [442] 0.9820900 0.9848863 0.9846036 0.9862249 0.9858151 0.9850586 0.9873705
## [449] 0.9883383 0.9876319 0.9889282 0.9896721 0.9895564 0.9931404 0.9925248
## [456] 0.9935945 0.9929638 0.9925219 0.9927085 0.9933376 0.9942437 0.9938765
## [463] 0.9943511 0.9942994 0.9943825 0.9945638 0.9947310 0.9948743 0.9949959
## [470] 0.9949320 0.9947403 0.9945752 0.9949737 0.9970513 0.9956565 0.9957695
## [477] 0.9955810 0.9954048 0.9956314 0.9951814 0.9950968 0.9949065 0.9950615
## [484] 0.9946736 0.9942571 0.9944472 0.9945353 0.9945215 0.9940062 0.9945996
## [491] 0.9942895 0.9942117 0.9939920 0.9936414 0.9937132 0.9934213 0.9934568
## [498] 0.9930610 0.9924884 0.9930951 0.9930343 0.9928065 0.9919996 0.9925688
## [505] 0.9920226 0.9915546 0.9918815 0.9916611 0.9920173 0.9914059 0.9920427
## [512] 0.9913086 0.9911478 0.9911749 0.9916247 0.9913313 0.9908211 0.9914343
## [519] 0.9913444 0.9908032 0.9916797 0.9913395 0.9912617 0.9910231 0.9913686
## [526] 0.9912877 0.9908965 0.9914556 0.9916754 0.9913003 0.9908425 0.9918282
## [533] 0.9916311 0.9910005 0.9918976 0.9921209 0.9919003 0.9915214 0.9921699
## [540] 0.9919753 0.9911522 0.9925253 0.9924619 0.9923777 0.9919636 0.9930157
## [547] 0.9927862 0.9923101 0.9928325 0.9930217 0.9926236 0.9925538
```

```r
pf(df$Deceased, df1=1, df2=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
```

```
##    [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [57] 0.0000000 0.0000000 0.3645399 0.0000000 0.0000000 0.3645399 0.0000000
##    [64] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [71] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [78] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [85] 0.0000000 0.3645399 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [92] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [99] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [106] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [113] 0.0000000 0.3645399 0.0000000 0.3645399 0.3645399 0.0000000 0.0000000
##   [120] 0.3645399 0.3645399 0.3645399 0.3645399 0.0000000 0.3645399 0.0000000
##   [127] 0.5444787 0.0000000 0.3645399 0.0000000 0.3645399 0.0000000 0.3645399
##   [134] 0.3645399 0.3645399 0.0000000 0.0000000 0.3645399 0.0000000 0.0000000
##   [141] 0.3645399 0.0000000 0.0000000 0.0000000 0.0000000 0.3645399 0.0000000
##   [148] 0.0000000 0.0000000 0.0000000 0.0000000 0.3645399 0.3645399 0.3645399
##   [155] 0.0000000 0.0000000 0.0000000 0.0000000 0.4769607 0.0000000 0.0000000
##   [162] 0.0000000 0.0000000 0.4769607 0.4769607 0.4769607 0.3645399 0.3645399
##   [169] 0.4769607 0.3645399 0.4769607 0.4769607 0.3645399 0.3645399 0.3645399
##   [176] 0.6256549 0.5910231 0.6256549 0.4769607 0.4769607 0.5910231 0.3645399
##   [183] 0.4769607 0.5444787 0.6929021 0.3645399 0.4769607 0.5444787 0.6746670
##   [190] 0.5444787 0.6256549 0.5910231 0.4769607 0.6746670 0.6256549 0.6527350
##   [197] 0.5444787 0.7217215 0.6746670 0.7217215 0.7528972 0.6527350 0.6746670
##   [204] 0.7083756 0.7436977 0.7686669 0.6256549 0.7333869 0.7217215 0.7528972
##   [211] 0.7217215 0.6746670 0.6527350 0.6746670 0.6746670 0.5910231 0.6746670
##   [218] 0.7217215 0.7333869 0.7333869 0.7217215 0.7436977 0.7528972 0.7436977
##   [225] 0.7436977 0.7611718 0.7686669 0.7611718 0.7686669 0.7436977 0.7611718
##   [232] 0.7083756 0.7436977 0.7875201 0.7754978 0.7875201 0.7928494 0.7977968
##   [239] 0.8024057 0.8067131 0.8024057 0.8024057 0.7977968 0.8067131 0.8107506
##   [246] 0.8305970 0.7977968 0.8067131 0.8107506 0.8107506 0.8181202 0.8067131
##   [253] 0.8145451 0.8181202 0.8107506 0.8181202 0.8067131 0.8024057 0.7977968
##   [260] 0.8107506 0.8145451 0.8214961 0.8067131 0.8024057 0.8145451 0.8214961
##   [267] 0.8107506 0.8214961 0.8181202 0.8214961 0.7977968 0.8145451 0.8246907
##   [274] 0.8214961 0.8277198 0.8246907 0.8277198 0.8024057 0.8214961 0.8277198
##   [281] 0.8214961 0.8246907 0.8277198 0.8145451 0.8067131 0.8277198 0.8305970
##   [288] 0.8181202 0.8214961 0.8214961 0.8024057 0.7928494 0.8246907 0.8277198
##   [295] 0.8214961 0.8277198 0.8181202 0.8246907 0.8067131 0.8145451 0.8214961
##   [302] 0.8246907 0.8107506 0.8181202 0.8246907 0.8024057 0.8214961 0.8277198
##   [309] 0.8359438 0.8305970 0.8384341 0.8277198 0.8107506 0.8359438 0.8452753
##   [316] 0.8214961 0.8305970 0.8384341 0.8305970 0.8145451 0.8408144 0.8246907
##   [323] 0.8246907 0.8107506 0.8305970 0.8333347 0.8246907 0.8246907 0.8067131
##   [330] 0.8067131 0.7754978 0.8024057 0.8181202 0.7611718 0.8145451 0.8277198
##   [337] 0.8333347 0.8107506 0.8024057 0.8181202 0.7928494 0.8145451 0.8181202
##   [344] 0.8181202 0.8107506 0.8067131 0.8107506 0.7977968 0.8181202 0.8214961
##   [351] 0.7928494 0.8107506 0.8246907 0.8024057 0.7817570 0.8214961 0.7875201
##   [358] 0.8024057 0.7928494 0.8107506 0.7977968 0.7817570 0.7928494 0.7977968
##   [365] 0.7928494 0.8067131 0.7875201 0.8024057 0.7817570 0.7754978 0.7977968
##   [372] 0.7817570 0.7928494 0.7754978 0.7928494 0.7754978 0.7928494 0.7875201
##   [379] 0.7754978 0.7875201 0.7754978 0.7686669 0.7528972 0.7875201 0.7754978
##   [386] 0.7611718 0.7686669 0.7528972 0.7686669 0.7754978 0.7611718 0.7817570
##   [393] 0.7611718 0.7611718 0.7875201 0.7686669 0.7528972 0.7754978 0.7686669
##   [400] 0.7611718 0.7754978 0.7754978 0.7528972 0.7436977 0.7754978 0.7611718
##   [407] 0.7528972 0.7611718 0.7436977 0.7686669 0.7333869 0.7686669 0.7528972
```

```
## [414] 0.7686669 0.7817570 0.7686669 0.7528972 0.7436977 0.7217215 0.7217215
## [421] 0.7436977 0.7611718 0.7611718 0.7436977 0.7333869 0.7754978 0.7686669
## [428] 0.7333869 0.7611718 0.7436977 0.7217215 0.7436977 0.7611718 0.7754978
## [435] 0.7875201 0.8067131 0.7817570 0.7754978 0.7333869 0.7977968 0.8067131
## [442] 0.7977968 0.8024057 0.8246907 0.8181202 0.8024057 0.8277198 0.8067131
## [449] 0.8277198 0.8246907 0.8181202 0.8333347 0.8277198 0.8384341 0.8566985
## [456] 0.8672854 0.8686141 0.8672854 0.8686141 0.8630436 0.8779790 0.8790141
## [463] 0.8838214 0.8747067 0.8847159 0.8880977 0.8855900 0.8960554 0.9050929
## [470] 0.9060644 0.9040906 0.9055824 0.9019870 0.9008818 0.9060644 0.9125095
## [477] 0.9181061 0.9222124 0.9300725 0.9323264 0.9337134 0.9302690 0.9245475
## [484] 0.9310387 0.9333747 0.9340470 0.9319659 0.9296745 0.9333747 0.9363982
## [491] 0.9250384 0.9202384 0.9357959 0.9383801 0.9360992 0.9168081 0.9257571
## [498] 0.9333747 0.9294729 0.9290645 0.9353328 0.9269105 0.9280116 0.9235359
## [505] 0.9014390 0.9025258 0.9136463 0.9125095 0.9045957 0.9219394 0.9242983
## [512] 0.9205297 0.9147400 0.9147400 0.8829058 0.9117262 0.9092436 0.9222124
## [519] 0.9168081 0.9232766 0.9202384 0.8940548 0.9083684 0.9222124 0.9237926
## [526] 0.9222124 0.9187327 0.9113265 0.9060644 0.9074673 0.9168081 0.9181061
## [533] 0.9008818 0.9187327 0.9132723 0.8973278 0.8790141 0.9092436 0.9096720
## [540] 0.9161356 0.9193452 0.9065391 0.8864446 0.9202384 0.9257571 0.9190407
## [547] 0.9181061 0.9140156 0.8966975 0.8769169 0.9147400 0.9237926
```

```r
qf(df$Confirmed, df1=1, df2=1, ncp=1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qf(df$Confirmed, df1 = 1, df2 = 1, ncp = 1, lower.tail = TRUE, : NaNs
## produced
```

```
##   [1]   0   0   0 Inf Inf   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0 Inf NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN Inf NaN Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0 Inf NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rf(df$Confirmed,df1=1,df2=1,ncp=1)
```

```
##    [1] 8.885510e-02 4.438004e+00 1.890562e+00 3.717471e+00 3.688199e+01
##    [6] 1.151280e-03 5.512088e-01 2.351264e-01 8.074644e+00 1.618840e-01
##   [11] 2.416559e+01 2.614213e+00 3.302346e+01 5.015459e-02 1.850302e+00
##   [16] 1.128303e+01 3.489544e+00 2.361517e-01 6.273283e+01 6.768161e+00
##   [21] 1.401116e+00 1.018473e-01 5.886898e+00 5.023437e+00 4.554009e+01
##   [26] 1.172771e+00 1.306906e+01 6.663078e-01 2.539188e+02 1.869823e-01
##   [31] 3.438361e-01 3.170078e-01 9.605458e-01 7.602691e+00 2.664745e+02
##   [36] 2.036426e+01 1.538313e+01 4.292618e+00 1.164946e+02 8.040799e+01
##   [41] 1.800925e-02 4.881140e+01 4.582352e+02 6.853949e+00 3.416382e-01
##   [46] 7.867820e+01 2.080109e-01 2.369698e-01 4.571065e-01 2.986063e+00
##   [51] 2.642661e+00 2.821655e+00 3.486643e+00 1.046153e+00 6.487356e+01
##   [56] 4.550977e+01 3.400282e+00 2.303013e+01 1.444543e+00 1.197846e-03
##   [61] 1.932031e-04 1.501768e-01 1.080273e+00 1.859201e+00 5.865848e+00
##   [66] 1.017609e+01 7.224217e+00 4.228419e-03 5.113689e-01 3.178647e-02
##   [71] 7.806582e+00 6.198196e-01 1.640407e-01 2.137349e+01 6.782440e-01
##   [76] 3.957262e-02 6.003802e-01 1.884050e+00 3.697765e+00 2.545902e+00
##   [81] 5.760670e-01 4.266936e+01 1.123708e+02 3.448337e+00 2.080727e+00
##   [86] 7.103256e+01 2.907253e-01 3.614671e+02 2.406580e+00 2.664329e+00
##   [91] 3.314755e+00 2.032769e+00 2.177139e+03 3.934804e-01 3.632379e-03
##   [96] 8.047672e-02 2.383705e+02 2.869483e-01 5.502034e+00 1.479869e+01
##  [101] 9.099825e+00 1.198544e-01 3.011381e+00 2.358993e+00 3.891521e+00
##  [106] 2.719259e+01 2.740212e-01 1.056369e+00 3.393126e-01 2.453764e+00
##  [111] 1.073061e+01 2.905851e-03 5.490755e-01 7.715969e-02 9.360550e-01
##  [116] 3.859579e+00 2.711609e-02 3.480001e+00 1.220343e-02 8.021314e-02
##  [121] 2.284497e+02 4.238343e+02 3.276988e-02 6.517576e+00 2.373283e-02
##  [126] 2.822430e-03 5.144894e+01 1.553483e-01 1.002734e+01 7.184633e+00
##  [131] 6.831645e-01 2.307206e+00 3.285750e+00 3.585392e+00 1.389283e+00
##  [136] 4.646631e-02 2.445412e+01 2.938792e-01 3.321126e+02 6.719708e+01
##  [141] 2.405074e-01 7.578291e-01 3.530469e-01 2.168637e+01 3.507744e-02
##  [146] 5.127008e-01 6.397395e+02 3.048488e-01 7.726500e+00 4.219807e+00
##  [151] 2.804135e+00 7.871010e-01 6.384881e-02 4.250926e+00 9.315801e-02
##  [156] 5.640525e-02 8.082795e+00 4.914978e+00 1.724697e-01 1.026978e+00
##  [161] 3.428080e-01 1.005753e-04 4.717998e-01 3.009670e+00 1.553237e+01
##  [166] 2.976863e-02 1.375159e-02 2.101017e-01 4.532860e-01 1.565510e-01
##  [171] 9.049081e-01 1.596026e+01 4.609923e+01 6.565828e-01 3.490114e-01
##  [176] 1.831485e+01 1.734606e-01 9.800625e+00 1.596652e+00 3.131702e-02
##  [181] 9.660599e-01 1.743255e+00 2.828688e+01 5.173018e+00 1.761331e+01
##  [186] 1.051716e+00 3.221657e-02 1.066913e-01 6.914032e-03 7.269199e-01
##  [191] 7.783283e+01 1.782495e+02 1.389329e-02 7.211742e-01 1.574248e+01
##  [196] 4.198817e+02 3.002471e+01 7.665905e+00 4.621505e-01 3.639420e+01
##  [201] 5.194686e+00 2.193305e-01 1.161758e+01 2.771667e+00 1.028178e-01
##  [206] 3.239735e-01 4.020574e+01 2.419344e+00 2.926809e+02 1.185235e-01
##  [211] 2.853294e-02 1.637273e+01 1.316811e+00 1.627951e+00 1.321196e-02
##  [216] 1.320886e-01 1.261655e-01 1.617914e-04 2.119272e+00 3.491076e-01
##  [221] 1.005484e+00 5.737598e-01 3.537925e-01 1.688583e+02 1.174589e+00
##  [226] 1.833868e+01 2.194522e+03 3.929426e+03 4.012289e+01 9.881165e+01
##  [231] 7.999679e-02 9.950986e-02 8.257804e+00 2.171027e+00 4.052421e+00
##  [236] 8.059562e+00 1.576486e-01 7.735814e+00 5.358064e-01 2.591024e-01
##  [241] 2.671071e-02 1.427114e+00 6.993437e-02 1.189112e+01 2.820696e+01
##  [246] 3.360307e+00 1.785276e-01 8.738445e+00 6.048838e-02 3.542474e+00
```

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## [251] 5.593966e-01 8.673896e-02 3.547151e+00 6.388901e+00 6.666711e-01
## [256] 1.538008e+00 5.998833e+00 7.337407e-01 4.952277e+00 1.211641e+01
## [261] 2.680636e+00 9.659377e-01 5.756794e+00 1.173258e+01 1.802310e+00
## [266] 1.534421e+00 3.351140e-03 1.016371e+00 8.067780e-02 2.028693e+00
## [271] 2.473730e+00 1.408068e+00 8.160296e-03 4.015541e+01 2.302024e+01
## [276] 2.035186e-01 5.395866e+01 4.134230e-01 5.726647e+00 4.066135e+01
## [281] 5.011862e-03 6.321922e-01 5.379467e+00 3.506090e+01 3.587307e+01
## [286] 3.142133e+00 2.547234e-02 1.354978e+01 7.513225e+02 2.020518e+00
## [291] 8.376871e+00 3.317771e-01 1.259968e-01 1.959806e-01 2.507792e+02
## [296] 1.145489e+00 1.304466e+00 3.335190e-03 1.811057e-01 1.568729e-01
## [301] 2.245078e-01 5.270511e+00 9.074065e+01 2.930494e-01 2.118326e+02
## [306] 1.120931e+01 2.320120e+03 6.303659e+00 8.681367e-01 1.221440e-01
## [311] 1.838828e-01 8.439636e-01 1.944398e-01 1.949630e+01 5.381020e-01
## [316] 3.586172e-01 2.239533e+00 2.672266e-01 9.447416e-01 3.151526e-01
## [321] 4.863555e+01 3.589662e+00 2.066167e-01 2.496029e-01 5.983988e+00
## [326] 1.523615e-04 5.604974e-02 5.351847e+02 3.453324e-04 1.809463e-01
## [331] 4.115061e+00 3.207562e-02 2.997645e+01 7.286749e-01 5.677317e+00
## [336] 4.660316e+00 7.543611e-02 8.076854e+01 3.971597e-01 5.166252e+01
## [341] 5.441942e+02 2.630758e-03 6.641411e+01 1.822451e+01 3.098004e+00
## [346] 8.153970e-01 4.491443e-01 1.619756e+00 1.773104e+02 5.547117e+00
## [351] 2.172062e+00 2.394775e+00 9.981728e-01 1.280947e+00 1.394038e+01
## [356] 7.651814e+01 1.608973e+02 3.903720e+00 7.225224e+01 1.428399e-01
## [361] 2.522835e+03 1.407810e-02 1.879978e+00 6.438809e-03 3.170182e+00
## [366] 6.687797e-05 1.054579e+01 8.183212e+03 6.873372e+00 1.249109e+01
## [371] 2.686861e+01 2.671658e+01 4.986372e+02 1.887784e+00 1.070144e+02
## [376] 1.143476e+00 9.833582e-01 1.389418e+00 3.597936e+00 2.308243e+00
## [381] 6.404498e-01 2.426725e+00 1.339094e+01 2.786002e+00 2.415781e+01
## [386] 2.042558e+01 7.104536e-02 2.889960e-01 1.521282e+00 3.546459e+00
## [391] 1.443294e+02 1.756517e+01 2.385458e-01 5.138325e+01 2.114286e+02
## [396] 6.376578e-04 1.338912e+00 1.063082e-03 1.517629e+00 3.790885e-03
## [401] 1.704278e+00 1.291439e+01 6.228594e+00 3.235261e+00 1.162206e-02
## [406] 8.103623e+00 1.504755e+00 7.285162e+00 3.321024e+00 2.850243e+00
## [411] 2.223920e+00 1.314260e+00 3.361304e+00 1.042527e+00 8.028694e+01
## [416] 4.080332e+00 3.364157e+02 1.146825e+00 8.563334e-01 2.382753e+00
## [421] 8.718011e+00 7.384166e+00 5.523231e-01 8.759589e-01 1.304613e+00
## [426] 6.843516e-01 2.580862e+00 1.208530e+00 1.021882e+01 1.525591e+00
## [431] 4.159540e-01 7.629486e+00 2.569076e-01 1.275213e+03 2.463861e-01
## [436] 2.265594e-01 6.735090e+00 1.241940e+01 1.025481e+02 1.086168e+02
## [441] 3.217064e-02 4.681998e+02 3.502971e+00 1.161582e+00 6.593007e+00
## [446] 7.853898e-01 1.342176e+00 6.465835e+01 6.261913e+00 3.994434e+00
## [451] 2.699566e-01 2.854308e+01 3.266896e+01 1.563065e+02 4.832291e-01
## [456] 2.325692e+02 2.904466e+00 7.432558e+00 8.580801e-01 1.682522e-01
## [461] 1.302163e+00 1.369364e+00 4.662787e-03 3.352826e+00 8.657154e-01
## [466] 8.556662e-01 8.937764e+01 1.717430e+02 1.300427e+00 1.767776e-01
## [471] 6.726455e+00 1.388051e-02 1.110361e-01 3.346173e-02 2.890971e+00
## [476] 2.412178e+01 1.946976e+00 2.422165e+01 3.866520e-01 5.995555e+00
## [481] 1.839790e+03 2.430376e+00 3.957700e-05 4.088843e-01 9.012189e-01
## [486] 7.873492e+02 9.228512e+00 1.601208e+01 9.994706e+00 8.060902e-01
## [491] 5.100875e-01 2.870666e+00 3.048475e+01 2.403268e+02 7.522641e+00
## [496] 4.230168e+01 8.659101e+00 5.046078e+00 1.398099e-01 2.084327e+00
## [501] 4.742603e+00 9.967813e-01 1.003902e+02 2.713340e+00 9.956411e-01
## [506] 4.215672e-04 9.525965e-01 3.456608e+00 2.785332e+02 9.222959e+00
## [511] 3.032417e-01 1.229072e-01 9.025823e+01 2.263590e+00 9.950591e+00
## [516] 6.300734e+01 5.404251e-01 9.895278e-01 3.002946e-01 1.417155e+00
```

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## [521] 5.316674e-01 2.178366e+01 1.147299e-01 3.979374e+01 4.025147e+00
## [526] 7.073124e-01 7.327544e+00 9.831122e+02 5.636026e+00 1.410891e+03
## [531] 7.590940e-01 2.269863e-01 1.688087e+00 1.180497e-02 6.433490e-01
## [536] 6.067055e+00 1.013898e-02 4.022329e-02 4.910257e-02 7.429614e-01
## [541] 2.425491e-01 1.025317e+01 1.343273e+00 1.263181e+00 1.325999e+00
## [546] 3.423364e+00 1.137873e+01 1.511116e+01 7.032682e+00 1.255390e+00
## [551] 5.608440e+00 2.732533e+02
```

```r
rf(df$Confirmed, df1=1, df2=1)
```

```
##    [1] 1.262885e+01 1.236271e-02 3.423275e+00 1.807784e+00 3.234035e-01
##    [6] 4.196944e-05 1.340057e+01 4.245740e-01 6.753557e-02 9.514850e+00
##   [11] 1.673974e+00 1.950695e-01 2.559888e+00 1.215766e+00 3.618288e+00
##   [16] 2.939339e-02 1.979484e-01 3.315661e+00 8.062671e-01 3.649637e-01
##   [21] 1.759591e-03 9.919781e-01 4.467383e+00 3.421415e+01 2.134067e+00
##   [26] 1.862728e+00 2.324533e+00 4.358143e-01 6.981026e-02 5.629468e-02
##   [31] 1.225492e-01 2.251516e+01 3.410904e+02 5.892947e+00 5.457471e-01
##   [36] 4.267956e+00 3.712082e+01 2.074436e+01 1.100536e-01 1.157856e+00
##   [41] 3.239625e-01 7.143339e-03 2.265986e+01 3.403491e+02 1.668331e+00
##   [46] 2.736237e-01 1.833373e+00 1.264746e+00 7.750144e+01 4.478021e+01
##   [51] 6.942589e+00 6.129361e-01 3.373087e+03 1.114178e+00 1.903969e-01
##   [56] 2.575816e-02 1.990521e+00 7.065909e+00 4.213864e+00 3.548817e+01
##   [61] 2.856420e-01 1.142054e-02 2.066290e+00 1.046440e-01 9.016067e+00
##   [66] 7.171218e+00 2.992306e+02 1.773757e-02 2.296011e-04 1.595314e-01
##   [71] 2.016557e-02 1.139161e+00 3.212118e+00 1.016258e+00 4.017512e-01
##   [76] 6.627103e-01 1.247920e+02 2.280028e+00 1.728195e+00 1.958129e+02
##   [81] 1.302414e-02 1.699863e+00 5.459212e-02 3.578223e-02 1.621292e-01
##   [86] 2.012460e+01 1.419454e-02 1.736322e+00 1.451800e+01 2.278507e+01
##   [91] 4.483809e-01 7.888305e-01 5.767896e-02 6.823702e+00 1.256237e-01
##   [96] 1.161860e+00 1.665051e+00 4.491033e-02 3.337523e-03 1.108986e+02
##  [101] 1.176561e+01 9.339190e-03 1.683352e+00 7.306551e+00 3.129868e+00
##  [106] 9.304248e+00 3.333417e+02 1.258220e-04 2.348635e+02 4.812986e-01
##  [111] 8.004399e-02 3.371073e+00 1.543083e+00 8.793184e-02 2.942736e+00
##  [116] 1.746139e-01 1.624836e-01 4.768952e-02 3.828746e-04 1.686391e-02
##  [121] 5.244121e-01 1.429033e+00 9.919306e+00 6.811357e-04 6.908284e-02
##  [126] 4.066797e-02 5.550946e+00 1.646008e+01 1.059243e+00 8.838266e-01
##  [131] 3.356478e-03 3.696932e-01 9.421237e+00 1.522953e+01 4.153659e-01
##  [136] 3.904778e+00 3.983580e+00 7.871916e-01 1.142320e+00 9.881980e-01
##  [141] 3.608407e+01 1.002448e-01 3.571318e+04 2.055516e-01 7.263419e-01
##  [146] 6.548069e-03 1.524446e+01 9.765100e-02 1.574975e+00 7.777562e-01
##  [151] 2.565154e+03 3.971958e-01 3.648114e+00 7.329774e-01 6.760193e+00
##  [156] 1.036045e+02 9.147138e-02 3.397842e+00 2.840233e+00 6.506059e-01
##  [161] 5.449791e-04 3.362151e+00 4.330645e-01 3.281886e-02 1.343085e-03
##  [166] 2.127730e+02 9.083126e+00 2.046932e-01 2.259734e+00 5.377050e-01
##  [171] 4.503321e-02 2.878373e-02 5.233034e+00 6.914319e+00 1.553990e+00
##  [176] 4.279198e-02 3.388742e+01 8.278170e-04 4.151375e-01 1.509026e+00
##  [181] 2.800793e+00 9.197432e-02 8.017271e-02 3.926711e+00 1.416442e+01
##  [186] 3.687521e+00 2.274105e+03 4.445597e-03 1.580030e-01 1.294060e-02
##  [191] 2.901227e+00 9.557881e+00 1.077883e+00 5.888867e+02 2.969323e+02
##  [196] 6.628291e-02 2.623558e-02 1.392169e+00 1.086494e-03 4.339466e-01
##  [201] 5.481323e-01 2.703450e+00 7.488648e-02 8.079509e+00 9.376540e+00
##  [206] 1.273539e-01 3.347846e-01 1.796447e-01 9.017860e-01 3.932906e+02
##  [211] 5.964157e-02 1.121361e+01 2.362157e+00 2.554026e-02 1.554165e-01
##  [216] 9.803659e-01 3.128669e-01 7.167481e-06 3.369844e+01 2.420290e-01
##  [221] 1.591717e-02 1.351133e+00 2.839562e-03 5.102537e-01 9.846132e-01
```

```
## [226] 2.667855e+00 8.710777e+00 7.724683e+00 6.519138e+00 2.825778e+01
## [231] 6.554263e-01 1.247689e+00 2.990248e+00 2.474195e+01 2.148668e+00
## [236] 5.548150e-01 4.408388e-01 3.821158e+00 1.727816e+04 4.958180e-01
## [241] 2.603361e-01 4.572079e-01 2.004259e+00 2.342675e+01 1.407773e+00
## [246] 2.802880e-03 4.786159e+01 5.828127e+00 2.841571e+00 8.486419e-01
## [251] 9.694013e-01 1.061662e-02 1.635064e-01 2.879068e-01 3.213426e+00
## [256] 1.385255e-02 5.463044e+01 1.958564e-01 5.162050e+02 4.423898e-04
## [261] 2.552872e-01 3.337452e-04 2.426437e-01 6.486512e+01 3.717221e+00
## [266] 4.791801e+00 3.843573e+01 5.981473e-01 7.375968e+01 4.708825e-01
## [271] 9.201335e-01 1.497157e+00 2.985070e+00 9.885820e-02 1.462135e-02
## [276] 3.148951e+00 2.044394e+00 2.353355e-01 2.151781e-01 4.387405e-03
## [281] 8.021633e-04 5.287318e-02 7.161863e+01 1.609831e+00 1.108799e+01
## [286] 1.484546e-01 2.223062e-02 2.997801e+00 1.416011e+00 1.873633e+00
## [291] 1.093264e+00 1.760888e+00 5.923555e+00 1.582688e-01 1.152479e+00
## [296] 8.108567e-02 3.964472e-01 1.917055e+01 1.478292e+00 2.910297e-01
## [301] 6.443793e+01 6.856609e-01 5.351014e-02 7.225690e-01 1.363225e+00
## [306] 4.323918e+00 8.252217e+00 1.456965e+00 1.303411e-01 5.226126e-01
## [311] 1.043452e+00 3.391878e-01 7.582411e-01 5.151787e-03 2.938998e-02
## [316] 3.430791e+01 3.851620e-01 5.249828e-01 3.474495e+00 5.690817e-02
## [321] 4.135799e-01 2.005031e-01 1.962408e-01 2.394895e+00 1.439536e-01
## [326] 8.062871e-02 2.452805e+00 3.693745e+00 2.298869e-03 4.138422e-01
## [331] 6.995638e-02 6.425187e+02 1.753751e-02 5.400687e+00 1.746841e-01
## [336] 2.006100e-01 1.949990e-01 1.383477e-01 6.939049e-02 5.570220e-02
## [341] 2.057829e-01 7.129521e-04 7.856581e-01 2.899700e+00 8.111440e-02
## [346] 1.543279e-01 9.802835e+00 4.116704e-01 6.158840e-01 1.640069e-01
## [351] 3.135572e-01 1.728439e-01 4.722143e-02 1.062846e+01 1.111182e+00
## [356] 9.318337e+01 1.760375e+02 3.317946e+01 2.681062e-01 4.566107e+00
## [361] 3.924287e+00 2.025313e-01 3.642415e+00 3.262646e-01 2.474300e+00
## [366] 6.285204e-02 1.293938e+00 7.550643e-01 2.780080e+00 5.617051e-02
## [371] 1.357451e-01 8.174446e+00 4.795244e-01 7.820743e+03 6.778370e-02
## [376] 2.550543e+00 1.091384e-01 2.458523e-02 7.120564e-02 5.002431e+01
## [381] 8.434861e-02 4.436182e-01 5.164207e-01 2.697414e+00 2.604997e+01
## [386] 5.117763e+00 1.522116e-01 3.523682e-01 2.870040e+00 6.381275e-01
## [391] 6.484045e-01 1.377198e+00 4.475895e-01 2.335261e+00 1.126004e-01
## [396] 1.414524e+01 1.493805e+00 2.877258e-03 7.655697e-02 4.239774e-02
## [401] 3.068249e+01 9.020141e+00 6.649477e+00 4.591153e-03 1.032141e+01
## [406] 1.818805e-01 1.215859e+00 3.207002e+02 6.700815e-01 4.763075e-01
## [411] 4.904440e+01 2.254141e-01 1.022700e+06 2.654058e-01 3.772692e-02
## [416] 9.020162e-02 7.479331e+00 3.184151e+00 2.051524e+01 1.097580e+01
## [421] 6.127987e-02 7.433615e-01 3.398905e-02 5.187905e+00 7.887804e-01
## [426] 1.431180e+01 2.195780e+01 6.391516e+01 2.256322e-01 3.527185e-03
## [431] 4.565361e-01 6.923841e-02 5.054247e+02 7.543835e-01 2.131936e-02
## [436] 1.853685e-02 1.641182e+00 1.210769e+00 1.088309e-02 1.354344e+01
## [441] 1.119420e+00 8.163147e-02 1.604588e+01 2.718395e+01 8.349183e-01
## [446] 7.524423e-02 9.514838e-02 1.406070e+01 9.761843e+00 1.027687e-01
## [451] 1.716283e+00 9.428126e+00 1.083504e+00 2.877037e-01 6.049967e-02
## [456] 6.819042e-02 1.920229e+00 4.099324e+00 3.708449e+00 9.409208e-01
## [461] 5.028342e+01 2.360440e+00 6.618065e-01 5.302979e-03 3.300177e+00
## [466] 3.978356e-02 4.160626e+01 2.689776e+01 4.134899e+00 5.695767e-01
## [471] 4.338036e-01 1.763647e+00 3.462608e-01 3.884402e+00 5.399310e+00
## [476] 3.197399e-01 1.656278e+01 8.829487e+01 9.435030e-02 3.890599e-01
## [481] 1.971755e+02 2.456424e-01 2.933074e-01 2.848103e-01 2.932605e-02
## [486] 2.470949e-01 9.544174e-01 9.460189e+01 4.588990e-01 6.867387e-02
## [491] 4.809073e+01 8.242063e+00 9.726744e-02 8.455128e-01 3.157741e-01
```

```
## [496] 7.898744e+00 1.848060e-01 1.684641e+01 1.840489e-01 1.098364e-02
## [501] 2.870364e+00 1.300510e+01 5.617335e+00 3.846444e-02 3.297420e+00
## [506] 2.282083e+00 4.774682e-01 3.427591e+01 7.991615e-01 2.257516e+01
## [511] 3.094977e-01 2.623216e+00 1.431200e+01 4.572186e+02 3.614657e+00
## [516] 4.377047e-02 7.674593e-02 3.222893e-01 7.075006e-02 4.279245e+01
## [521] 9.309105e-01 2.174122e-01 1.042634e-05 1.061805e+01 6.257940e-03
## [526] 1.956490e+00 1.680399e+00 2.255005e-01 4.317119e-01 6.561436e+00
## [531] 9.794761e-02 2.819452e+02 1.482555e+00 8.487644e+00 2.978159e+00
## [536] 8.728723e+00 1.156134e+00 3.984228e-01 1.352577e+01 2.032532e-01
## [541] 3.377984e-01 6.636845e+00 1.225429e+01 2.450533e+00 4.111772e-01
## [546] 1.465895e+01 1.696156e+00 9.412005e-01 2.361203e+01 1.041438e+00
## [551] 4.028573e-01 1.348327e-03
```

```r
rf(df$Recovered,df1=1,df2 = 1)
```

```
##   [1] 2.566097e+00 4.185268e-01 2.324688e-01 1.554377e+00 2.148041e+00
##   [6] 7.118257e+00 3.251163e-01 6.877006e+01 1.398219e+00 1.652926e+00
##  [11] 2.535063e-02 4.373583e-01 1.687376e-01 2.745297e-02 7.020549e+03
##  [16] 1.512415e+02 1.355526e-01 3.261745e+00 2.340814e-01 1.041318e-04
##  [21] 1.787528e+00 7.199773e-02 9.523162e-02 3.305786e+00 7.506862e-03
##  [26] 1.742654e+01 8.673600e+00 1.461186e+00 3.895708e-01 3.187823e-02
##  [31] 1.661974e-03 4.275222e-01 4.046543e+03 6.997086e-01 4.674611e-02
##  [36] 1.355782e-01 1.385166e-01 3.705380e+00 2.937888e-01 1.631977e+01
##  [41] 1.480894e-01 1.917719e+01 1.580314e+00 3.214213e+00 2.971789e-02
##  [46] 1.074109e+02 8.063521e-01 2.984036e-01 1.785306e+01 2.048965e-01
##  [51] 3.345228e+00 4.080187e+00 5.415407e+00 8.483151e+00 1.549947e-03
##  [56] 3.229722e+02 1.136037e+01 8.365293e+01 3.644620e+00 2.096363e+00
##  [61] 4.950748e-02 8.261892e-04 4.203617e+00 1.122736e+01 5.605356e+00
##  [66] 1.187230e+00 2.634156e+00 8.801651e-01 3.840840e+00 1.088824e-02
##  [71] 5.472797e-01 3.873101e+00 1.434795e+00 1.424272e-01 6.493049e+00
##  [76] 8.153700e-01 2.794624e-01 9.141969e-01 4.777296e-01 3.058676e-02
##  [81] 1.069521e+02 2.565084e+00 5.696175e+01 2.272065e+00 3.786099e+00
##  [86] 1.156877e+00 4.822137e-01 5.384349e-01 1.237138e+00 1.142934e+03
##  [91] 9.960112e-01 3.235261e+02 1.764565e+03 1.399697e-01 1.650975e+00
##  [96] 2.235775e+00 1.564812e+00 6.203585e-01 2.397926e+00 1.495190e-01
## [101] 5.627848e-01 3.752970e-01 6.499852e-01 5.818993e-05 5.785698e+00
## [106] 3.268271e-02 1.844551e+00 4.969700e-03 1.849330e+00 9.050487e-01
## [111] 1.382807e+00 4.862202e-01 1.975292e+00 2.328281e+03 4.760738e-04
## [116] 3.888056e+01 2.600176e+01 8.986580e-02 3.052801e+02 1.056102e+01
## [121] 2.920965e-01 8.044111e-03 6.973320e-01 3.063393e+01 3.908165e-03
## [126] 3.019757e-01 1.040311e+02 2.227470e-03 2.595422e+00 1.858588e-01
## [131] 2.162214e-01 2.142300e+00 6.070829e-02 2.890229e-04 4.738527e+00
## [136] 1.179976e+00 4.806614e+00 1.325753e+00 2.272594e+00 5.647264e-01
## [141] 9.546535e+01 2.219868e+00 2.746453e+01 5.821515e+00 1.906051e+00
## [146] 1.305846e+00 7.545999e+01 4.509579e+00 1.097346e+00 1.297696e-01
## [151] 4.402213e+00 2.501762e+00 1.427817e+00 1.323800e+01 2.923086e+02
## [156] 8.319036e+02 2.163081e+00 1.984287e-02 1.978891e-02 1.846058e+03
## [161] 4.412192e-03 2.626553e+00 5.016888e-01 2.115131e+01 3.187152e-01
## [166] 1.614984e+00 2.448421e-01 3.937419e+00 1.869184e+00 3.776525e+01
## [171] 4.277428e-02 1.542809e+01 2.105559e-02 3.951866e+00 2.187415e-01
## [176] 1.114382e+00 3.734711e+00 1.482730e-01 3.167578e+01 1.317150e-02
## [181] 3.279809e-01 1.297001e-01 1.780695e-01 5.300605e-01 8.180303e-01
## [186] 2.766743e-03 1.184563e+00 8.564056e+02 1.502466e+03 3.054967e-01
## [191] 1.342983e-02 9.380867e+00 2.622800e+01 3.717196e+00 2.416667e-01
## [196] 1.071356e+01 3.266416e+04 2.578549e-01 7.538281e+01 1.446062e+01
```

```
## [201] 3.229863e-02 4.394066e-01 1.630459e+00 5.420132e+00 1.411736e+02
## [206] 1.763085e+00 8.029737e+03 2.005907e+00 8.648149e-01 1.595569e-02
## [211] 1.104068e+00 1.287827e+00 6.937790e+00 1.609347e-02 2.326657e-01
## [216] 2.420102e-02 2.397809e-01 4.040976e+00 1.687604e+00 1.254593e+01
## [221] 4.807049e-02 6.819134e-01 8.195493e-01 3.540883e+01 2.319219e-01
## [226] 7.932104e-02 1.704706e+00 7.321087e+01 6.236495e-01 1.457854e-01
## [231] 8.817516e+01 1.576088e+00 4.307297e+00 1.001088e-02 5.028982e+00
## [236] 1.425868e-01 3.487983e-02 3.761029e-03 3.763497e-01 1.257563e-01
## [241] 8.414472e-01 2.653146e+00 2.993167e+00 1.044810e+02 3.517855e-01
## [246] 2.968579e-04 4.804726e+02 1.556252e+02 1.494653e+00 8.108624e+00
## [251] 4.690831e-01 1.366658e-01 1.974823e+00 3.143845e+00 6.368266e-01
## [256] 7.099638e-01 1.197578e+02 1.403474e-01 2.297866e-01 4.753155e+00
## [261] 2.113183e+01 2.104797e-01 2.809776e+00 8.411243e-02 1.582021e+00
## [266] 1.045701e+02 5.783419e-02 7.706186e-01 2.300751e+00 7.941265e+03
## [271] 2.302180e-04 6.122024e-02 1.074029e+03 1.222719e+00 1.760265e+00
## [276] 1.866207e+00 6.498881e-01 3.799091e-01 6.535074e-01 1.154027e+00
## [281] 1.666305e+00 2.154554e+00 9.677685e-02 8.260459e-03 3.340012e-02
## [286] 2.406135e+01 4.031958e-02 9.818320e+03 9.230605e-01 1.468058e+00
## [291] 8.034819e-01 6.617374e+00 2.695651e-02 2.392733e-02 1.678363e-01
## [296] 5.475343e-01 3.422410e-03 1.264932e-04 1.045866e-04 1.165478e+01
## [301] 1.862316e+01 1.464475e-01 3.080727e+01 1.220730e+00 3.810484e+01
## [306] 2.361734e+01 1.374602e-02 2.350268e-01 2.209094e-01 6.048776e+01
## [311] 5.002834e-03 5.073998e-01 2.048478e-01 1.218287e+00 2.056320e+00
## [316] 1.344818e+00 2.944215e+02 5.821067e-01 1.129664e-04 5.033620e-02
## [321] 1.084449e+00 4.471584e-01 4.706420e-01 8.946258e+00 5.497586e-02
## [326] 8.554445e-01 1.296155e+00 4.308781e+01 8.932401e-01 1.774348e-02
## [331] 5.481728e+00 4.084855e+00 1.536465e-03 2.082450e+00 3.803348e-01
## [336] 4.119763e+01 2.321458e+00 3.181320e+01 7.173287e+00 6.145222e-01
## [341] 6.496866e+00 7.187190e-03 2.628818e-01 3.647621e-01 1.470884e+00
## [346] 1.028583e+00 2.836015e+00 3.432119e+00 9.342439e-02 1.255368e+01
## [351] 3.343168e-01 2.626753e-04 1.142420e+01 2.238923e+00 5.514993e-02
## [356] 2.300340e+02 1.531591e+00 1.291875e-01 2.946174e+00 1.545784e-01
## [361] 2.459018e+00 4.535124e+00 1.207807e-01 1.598308e+00 4.808011e-01
## [366] 2.786191e+01 5.452013e-01 2.681911e-01 1.991375e+01 1.373663e+01
## [371] 4.232117e-01 3.238908e-02 5.740295e-01 1.699591e+02 2.238473e-02
## [376] 2.350267e+01 7.489831e-02 5.358866e-01 1.553564e-01 6.997113e+00
## [381] 2.783151e+00 1.306631e-01 1.412719e+00 3.339324e-02 1.127583e+00
## [386] 5.367716e+01 6.291442e-03 2.313034e+00 1.798336e+00 3.930414e+00
## [391] 1.135372e+00 1.252899e-04 1.087297e-03 3.859672e+00 2.350458e-01
## [396] 2.207340e-01 4.968700e+00 1.549271e+00 2.036786e+02 1.295513e+01
## [401] 1.033784e+00 7.274103e-01 1.232038e-01 6.020128e-02 2.862454e+00
## [406] 2.848988e+01 3.807778e-01 8.024627e-03 4.834993e+00 4.993922e-02
## [411] 5.406370e+00 1.407521e+02 6.305671e-02 7.695004e-01 4.075473e+02
## [416] 2.188597e-03 2.525909e+00 2.921161e-01 5.842915e-01 1.906599e-01
## [421] 7.375970e-01 1.983553e+01 5.106751e-02 1.538407e-01 3.958366e+00
## [426] 3.524737e-01 3.502089e-02 2.592619e+00 7.911475e-01 8.113863e+01
## [431] 2.079701e-01 7.697579e-01 2.921170e-01 2.022856e-03 2.718961e+01
## [436] 1.511000e-02 2.081664e+02 1.237564e-03 2.468348e+02 2.126836e-02
## [441] 2.669717e+00 1.300534e-01 1.736475e+00 7.218222e-01 6.726500e+00
## [446] 1.743384e+01 1.172805e-02 1.358200e+01 9.669160e-02 2.966480e-02
## [451] 2.769906e-02 1.312105e+00 1.228856e+01 3.652064e-02 3.420188e+02
## [456] 1.071743e+00 1.978016e+01 4.126901e-01 3.633204e+00 1.318639e+00
## [461] 1.240610e+00 4.000785e+00 1.825060e-01 7.199284e-01 9.387837e-01
## [466] 1.843155e+03 2.148565e-01 2.068467e-01 8.956980e+00 4.340601e-01
```

```
## [471] 1.230655e+00 1.756061e-01 3.794719e-01 3.081108e+01 8.095609e-01
## [476] 5.252449e-02 8.989992e+00 5.651270e-01 3.643379e+00 5.945420e-02
## [481] 1.093880e+00 1.268227e+00 3.953184e+01 1.312210e+00 1.735284e+00
## [486] 2.589467e-01 3.574919e+01 1.703562e-01 2.298998e-02 5.609721e-01
## [491] 1.251805e-05 3.070426e-01 2.311267e+00 4.825702e-01 2.889170e-02
## [496] 2.111509e-02 5.208104e-03 1.903856e+01 9.765657e-03 1.530253e+01
## [501] 2.871810e-03 6.771798e-01 3.881889e+00 1.381657e-02 4.467287e-02
## [506] 6.387364e+01 3.804078e+00 6.286372e-01 1.678708e-01 1.404832e-01
## [511] 4.107118e-01 3.990854e+00 1.821969e+01 8.810603e+00 9.651297e-02
## [516] 7.798298e-03 7.966580e-03 1.650624e-01 6.608040e-02 1.634049e+00
## [521] 2.904329e+02 4.339993e-01 2.119790e-01 1.220773e-01 3.313776e+00
## [526] 8.796989e-01 2.043386e+00 1.883924e-01 1.795517e+02 2.273320e-01
## [531] 4.875749e-02 2.185158e-03 2.183175e-02 1.034452e+00 3.104885e-01
## [536] 1.208000e+01 9.404051e-02 6.022631e-01 5.418949e-01 7.252617e-02
## [541] 1.349879e+00 3.491142e-01 1.114107e+00 3.805909e+02 1.147415e+01
## [546] 1.608928e-02 1.135180e+01 7.981442e-01 2.430264e+00 6.735082e-02
## [551] 7.906419e-01 5.553133e-01
```

```r
rf(df$Deceased,df1=1,df2=1)
```

```
##   [1] 8.414791e-01 4.364414e+01 3.385678e-05 7.547008e-01 4.006610e-03
##   [6] 3.557663e-01 6.808983e+00 1.597881e+01 8.072273e+00 2.860084e+02
##  [11] 3.587983e-01 4.231432e-01 1.628766e+00 2.866248e+00 1.542590e+00
##  [16] 5.302556e-01 6.339639e-01 4.744782e-02 2.187523e-01 7.404753e-03
##  [21] 2.072278e+00 4.328738e+02 7.374941e-02 6.813056e+00 2.898865e+00
##  [26] 1.235028e+00 6.356593e-01 1.167172e-01 2.939963e+01 2.674688e+00
##  [31] 1.855693e-02 4.913251e-02 1.611296e+02 1.951627e+01 6.987198e-03
##  [36] 2.624496e-01 9.850043e-01 1.039998e+00 3.123844e-01 1.919459e-01
##  [41] 1.228096e+00 4.547547e-01 9.938537e-01 1.652594e+01 8.509806e-01
##  [46] 4.693967e+00 1.715858e-01 1.095049e+01 1.797043e+01 2.169244e+00
##  [51] 1.837136e-01 5.219780e-01 9.363840e-01 2.596349e+02 4.746100e+01
##  [56] 1.627321e-01 2.855744e-01 1.260966e+02 8.910906e-01 1.177935e+00
##  [61] 5.564673e-01 2.736571e+00 9.142790e-01 1.273723e+00 5.379722e-01
##  [66] 1.987843e-01 8.627075e-01 1.287505e+00 9.069990e-01 4.023099e-01
##  [71] 1.807153e+00 3.734847e+00 7.527311e-01 1.084962e+01 3.784314e-01
##  [76] 7.496341e-02 1.100447e+01 4.880820e+01 3.390579e-01 4.910213e-04
##  [81] 5.182795e+00 1.971021e+01 1.700282e-01 3.939711e-01 4.347003e-01
##  [86] 3.670174e+00 1.587463e+02 1.854790e-02 3.898169e+00 2.598577e+01
##  [91] 1.848640e+01 1.286827e-01 5.906934e+00 2.687074e-01 2.572495e-01
##  [96] 2.575089e-02 2.513230e-03 3.846489e-02 7.434221e-02 6.714252e+00
## [101] 3.915763e-01 5.357170e+01 3.585295e-01 4.434585e+00 1.624286e+00
## [106] 7.234938e+00 5.485495e-01 9.053615e-02 2.869774e+00 5.895058e+01
## [111] 2.021528e+00 3.612880e-01 6.545913e-01 3.191907e+01 7.000280e-02
## [116] 8.705906e+00 8.500464e-01 1.180319e+02 8.387284e-03 5.215820e-01
## [121] 2.876567e-02 1.536068e-01 4.280313e+01 6.925574e+01 3.552678e+01
## [126] 9.375788e-01 1.503943e-01 2.215197e-01 3.601016e+00 3.667461e+00
## [131] 3.706562e-02 2.642590e+00 1.580278e+00 3.722016e+01 1.563515e-01
## [136] 8.426976e+01 7.178794e-01 2.643528e-01 2.301878e+00 9.870532e-02
## [141] 1.551027e-01 7.450134e-04 5.233181e-01 6.714950e+00 1.846000e+00
## [146] 1.524500e-01 1.604162e+01 7.695048e+01 1.258161e+00 2.921687e-01
## [151] 1.502718e+02 1.589552e+02 6.945308e-01 1.045782e+02 2.844450e-06
## [156] 1.961612e+00 8.238772e-02 1.722814e+01 3.881741e-01 1.804759e-01
## [161] 3.683415e-02 1.221134e+02 1.474583e+00 2.149921e+02 4.201326e-02
## [166] 4.004649e+01 3.881448e-03 5.388059e-02 2.384744e-03 2.605399e+00
## [171] 4.690797e+00 5.293482e+02 1.348484e+02 3.799873e-01 3.840055e-01
```

```
## [176] 3.591966e-01 2.517104e+00 6.230217e-02 2.784166e-02 1.086320e+01
## [181] 5.020764e+00 6.673601e-01 1.334153e-01 1.022534e+00 4.331689e-01
## [186] 3.792561e-01 1.889896e-01 8.968499e-01 2.653945e-02 1.725094e-03
## [191] 9.178272e-03 2.677840e-01 7.097805e-01 6.124968e-01 1.827814e+00
## [196] 3.749975e+00 2.792013e-01 2.146627e+00 4.126819e-01 6.943951e-01
## [201] 3.800388e-02 2.152514e-01 3.747714e-01 1.637320e-01 5.765762e-01
## [206] 4.218587e-01 8.105173e-01 2.616250e+01 2.926461e+00 2.742273e+00
## [211] 2.075584e-01 5.463825e+00 2.951076e-01 1.218691e+00 8.424679e+00
## [216] 4.527657e+00 2.007855e-02 9.037874e-01 1.932184e+02 7.659693e-01
## [221] 3.696093e-01 1.258007e+02 1.619635e+00 6.246715e-01 1.463270e+00
## [226] 1.864967e-01 9.855305e-03 2.371939e-01 7.859760e+01 4.572955e-01
## [231] 8.225534e-02 2.292267e-02 5.518450e+00 1.347875e+01 2.154825e+00
## [236] 1.630630e+00 4.728113e-03 1.003293e+01 5.011472e+00 2.802594e+02
## [241] 9.530539e+01 2.100052e+00 4.429253e+05 4.891303e-01 5.520962e+00
## [246] 3.363106e-01 5.994255e+00 2.940860e+00 1.374205e+00 8.171904e+00
## [251] 1.221248e+00 2.241394e+03 3.467907e-01 5.181860e+00 4.764431e-01
## [256] 2.224190e-02 1.261762e+00 8.987616e-01 2.513486e+01 9.422197e-01
## [261] 3.895511e-01 3.196521e+00 1.162132e+01 2.582864e-01 1.445351e+01
## [266] 4.882288e-01 6.729635e-01 5.386233e-02 2.722008e-01 3.043374e-01
## [271] 1.446277e-01 3.540984e+01 3.829106e+00 2.121027e-01 2.979324e+00
## [276] 3.268675e+00 7.688338e-02 3.254274e+01 1.128189e+00 5.581296e+00
## [281] 1.556051e+00 1.112688e+00 8.534956e-02 3.179062e+00 2.648821e-01
## [286] 8.462574e-01 1.453697e+01 3.073439e-01 1.330334e-01 1.286571e-02
## [291] 7.657801e-03 4.747868e+00 9.093059e-01 8.415893e-02 8.782684e+00
## [296] 6.531569e-01 5.423402e+00 3.517920e+01 8.085368e-02 3.349403e-01
## [301] 1.795785e-02 2.980097e+00 2.275384e+01 1.356064e-02 5.485359e+00
## [306] 1.140702e+02 2.711500e+00 1.035640e-01 1.122172e+01 5.564722e-01
## [311] 4.262449e+00 2.518480e+00 8.098248e-02 7.504459e-01 4.862090e+00
## [316] 8.359795e-01 5.558201e-01 5.964512e-01 6.755875e+02 2.061423e+04
## [321] 3.539067e-05 8.624927e-01 2.113220e-01 3.188686e-01 3.478079e+00
## [326] 1.367068e+01 9.611059e-03 1.164289e-01 2.398945e-02 2.699221e-01
## [331] 4.568668e-01 8.407839e+01 4.894896e-03 8.632969e+00 7.879112e-01
## [336] 5.690954e+00 4.953921e+00 9.834620e-02 8.351725e-02 2.050063e+00
## [341] 6.510155e+00 6.101216e-02 4.424802e+00 9.587117e+02 1.259959e+00
## [346] 3.503147e-01 1.543826e+02 3.748568e-01 1.964518e-02 1.600262e-01
## [351] 9.344630e-02 9.543844e-01 2.926587e+01 8.382063e-01 1.285429e-01
## [356] 1.470065e-01 4.292236e-02 8.303546e+01 5.219229e-02 1.821824e-01
## [361] 7.072614e-01 5.515197e-02 1.637734e-02 8.186013e-01 8.911396e+01
## [366] 1.958960e-01 4.670856e-02 3.102196e+00 2.413993e-02 4.806856e+00
## [371] 3.691812e+00 5.416197e-03 4.411083e-01 2.011684e+01 8.937477e-01
## [376] 4.204958e-02 8.373569e-02 9.099305e-02 9.306206e-01 9.110228e+00
## [381] 1.465404e+00 2.152691e+02 7.444755e-01 1.070950e+01 7.942289e+00
## [386] 1.280299e+00 6.699105e-01 1.766247e+01 6.304438e-01 6.588179e-04
## [391] 1.139251e+00 5.613484e+00 5.150354e-01 2.711141e+00 1.206905e+01
## [396] 4.889108e+02 8.101083e-01 4.024990e-03 1.381583e+02 7.494531e+01
## [401] 6.680143e+00 2.275228e-02 3.990185e-02 6.461230e-02 8.925502e-03
## [406] 2.538084e-01 2.783428e-01 4.723500e+00 3.066461e+00 4.615129e-03
## [411] 1.436222e-01 3.907387e-02 5.353987e+00 5.568612e-01 1.878816e-01
## [416] 7.399710e-01 2.866083e-01 2.971336e+00 7.943812e-02 3.688743e+02
## [421] 7.085474e-01 4.827378e-02 2.122959e+00 3.199631e+01 1.642476e-01
## [426] 4.595600e-02 3.468592e+00 1.358323e+00 3.184471e-01 2.508448e+00
## [431] 6.257100e-01 2.771185e+00 4.434877e-01 5.824901e+01 1.978945e-04
## [436] 1.632887e+00 1.348218e-01 1.386285e+00 3.401306e+00 1.750318e+01
## [441] 2.127940e+00 1.630363e+00 1.118470e+01 1.831934e+00 3.366426e+01
```

```
## [446] 7.542753e-01 6.397484e-01 1.556373e+00 3.294487e-02 5.688237e-01
## [451] 8.406353e+02 3.693772e-02 4.382639e+01 7.579349e+00 3.876983e-02
## [456] 4.527153e-01 2.453360e+00 9.447513e-02 2.712712e-01 2.349097e+01
## [461] 3.682787e-03 1.255223e-02 3.998374e-01 2.118591e-01 2.270604e+00
## [466] 8.742610e+01 2.009836e+00 7.535449e-03 1.331993e+01 6.593985e-01
## [471] 1.653381e+01 1.395647e+00 1.077990e+00 1.026967e-01 2.807877e-01
## [476] 4.005161e+00 6.442448e+00 3.773613e+00 9.756884e-02 1.056725e-01
## [481] 3.201634e-02 7.777786e+00 1.128441e+04 1.951741e-01 1.263750e-01
## [486] 1.970532e+00 2.472595e+00 2.559331e-01 1.024719e+00 8.312445e-03
## [491] 1.112462e+00 2.219723e+00 4.496014e-01 4.129969e-01 3.880103e-02
## [496] 6.947719e-01 1.159986e+00 3.488251e+00 3.576750e+01 1.082288e+01
## [501] 1.991543e+01 1.571725e+00 5.674762e-01 1.435989e-03 1.290804e+00
## [506] 8.895587e-01 5.970919e-01 9.272376e-01 6.962939e-01 1.668379e+00
## [511] 1.160208e-01 2.268672e+01 8.502103e-02 1.236818e-01 4.510552e-03
## [516] 1.651624e+01 1.961015e+01 4.085958e-01 1.376271e+01 5.429620e+00
## [521] 4.071583e+00 2.969563e-02 7.851136e-04 4.531485e+01 7.548958e-01
## [526] 3.583565e+00 6.579795e+03 5.742408e-01 2.024066e+01 2.590795e+02
## [531] 7.180968e-01 8.285136e-01 1.296502e+00 2.362368e-01 1.200516e+00
## [536] 2.286598e-01 9.584016e+00 8.292293e-01 5.234882e+01 3.715679e-02
## [541] 1.307008e-02 9.360462e+05 3.695910e-01 1.826041e+00 5.560106e+00
## [546] 7.359750e-01 1.108749e-01 2.089950e-01 2.269872e+01 7.267103e+00
## [551] 7.045835e-02 1.023197e-01
```

```
help("rchisq")
```

```
## starting httpd help server ... done
```

```
dchisq(df$Confirmed, df=1, ncp = 1, log = FALSE)
```

```
##    [1]          Inf          Inf          Inf 2.264666e-01 2.264666e-01
##    [6]          Inf          Inf          Inf          Inf          Inf
##   [11]          Inf          Inf          Inf          Inf          Inf
##   [16]          Inf          Inf          Inf          Inf          Inf
##   [21]          Inf          Inf          Inf          Inf          Inf
##   [26]          Inf          Inf          Inf          Inf          Inf
##   [31]          Inf          Inf          Inf          Inf          Inf
##   [36]          Inf          Inf          Inf          Inf 2.869452e-02
##   [41] 1.330132e-02          Inf 1.371033e-01 9.085233e-02          Inf
##   [46] 1.371033e-01 9.085233e-02          Inf          Inf 2.264666e-01
##   [51] 2.768476e-03 2.768476e-03 8.311543e-04 3.776700e-06 1.244035e-03
##   [56] 9.020799e-03 1.624334e-04 3.393344e-08 2.869452e-02 1.075359e-04
##   [61] 6.889568e-07 1.956001e-02 2.035717e-05 7.108270e-05 9.020799e-03
##   [66] 4.115094e-03 1.330132e-02 1.857970e-03 1.330132e-02 9.020799e-03
##   [71] 2.768476e-03 1.956001e-02 6.100952e-03 1.371033e-01 9.085233e-02
##   [76] 1.330132e-02 2.264666e-01 1.956001e-02 2.264666e-01 6.160064e-02
##   [81] 1.371033e-01 2.869452e-02 1.624334e-04 4.115094e-03 6.100952e-03
##   [86] 9.085233e-02 1.956001e-02 4.115094e-03 1.857970e-03 6.160064e-02
##   [91] 6.100952e-03 1.371033e-01          Inf 1.371033e-01          Inf
##   [96]          Inf 9.085233e-02          Inf          Inf 2.264666e-01
##  [101] 1.371033e-01 1.956001e-02 1.956001e-02 4.202971e-02 6.100952e-03
##  [106] 8.788406e-06 5.541669e-04 4.115094e-03 1.244035e-03 2.471840e-06
##  [111] 2.768476e-03 2.035717e-05 2.035717e-05 9.235810e-09 1.390101e-12
##  [116] 7.473136e-11 4.339920e-10 1.497758e-13 2.200564e-08 4.303205e-17
##  [121] 1.390101e-12 8.202896e-12 2.167877e-12 1.277186e-11 2.745338e-17
##  [126] 1.653821e-16 6.334089e-19 2.959429e-22 1.152626e-21 1.812488e-21
```

```
## [131]   2.426616e-18   2.426616e-18   3.654481e-13   1.056189e-16   9.905301e-16
## [136]   4.303205e-17   4.808225e-11   1.653821e-16   6.335368e-16   3.776591e-15
## [141]   1.647830e-19   1.228832e-23   2.021922e-25   1.081648e-26   1.106267e-27
## [146]   2.809150e-28   1.816132e-30   1.257392e-24   4.549523e-30   3.570267e-39
## [151]   1.228832e-23   1.984577e-24   3.240845e-26   2.874722e-30   4.579944e-32
## [156]   2.122026e-42   2.814125e-48   3.117473e-45   9.014990e-39   7.402762e-55
## [161]   8.891217e-61   1.245705e-68   1.529864e-84   1.711222e-99   1.841655e-88
## [166]   2.361645e-91  1.811571e-124  1.370444e-127  2.683324e-148  8.699204e-163
## [171]  2.381376e-121  4.629643e-169  2.052980e-163  7.017432e-148  1.042804e-214
## [176]  4.095770e-223  1.547688e-182  2.263790e-228  2.449045e-191  4.001253e-144
## [181]  6.593410e-242  2.626115e-186  3.217001e-103  4.193103e-272  6.496581e-234
## [186]  2.501609e-242  1.114420e-198  3.639686e-224  8.415997e-248  1.419309e-269
## [191]  1.341801e-259  2.204904e-295  3.594668e-251  1.741798e-245  9.471984e-295
## [196]  2.213270e-251   0.000000e+00   0.000000e+00   0.000000e+00  1.294645e-318
## [201]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [206]   0.000000e+00   0.000000e+00  1.058054e-257   0.000000e+00   0.000000e+00
## [211]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00  1.294645e-318
## [216]  3.158074e-236  3.211427e-322  2.964394e-323   0.000000e+00   0.000000e+00
## [221]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [226]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [231]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [236]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [241]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [246]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [251]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [256]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [261]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [266]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [271]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [276]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [281]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [286]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [291]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [296]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [301]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [306]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [311]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [316]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [321]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [326]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [331]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [336]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
```

```
## [401]  0.000000e+00  0.000000e+00  0.000000e+00 1.075128e-293  0.000000e+00
## [406]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [411] 4.537262e-218  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [416]  0.000000e+00  0.000000e+00 4.536429e-257  0.000000e+00  0.000000e+00
## [421]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 1.185758e-322
## [426]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [431]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [436]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [441]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [446]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [451]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [456]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [461]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [466]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [471]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [476]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [481]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [486]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [491]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [496]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [501]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [506]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [511]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [516]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [521]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [526]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [531]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [536]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [541]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [546]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [551]  0.000000e+00  0.000000e+00
```

```r
dchisq(df$Recovered, df=1, ncp = 1, log = FALSE)
```

```
##   [1]          Inf          Inf          Inf          Inf          Inf
##   [6]          Inf          Inf          Inf          Inf          Inf
##  [11]          Inf          Inf          Inf          Inf          Inf
##  [16]          Inf          Inf          Inf          Inf          Inf
##  [21]          Inf          Inf          Inf          Inf          Inf
##  [26]          Inf          Inf          Inf          Inf          Inf
##  [31]          Inf          Inf          Inf          Inf          Inf
##  [36]          Inf          Inf          Inf          Inf          Inf
##  [41]          Inf          Inf          Inf          Inf          Inf
##  [46]          Inf          Inf          Inf          Inf          Inf
##  [51]          Inf          Inf          Inf          Inf          Inf
##  [56]          Inf          Inf 9.085233e-02 1.330132e-02 6.160064e-02
##  [61]          Inf 6.160064e-02 1.371033e-01 1.371033e-01 1.244035e-03
##  [66] 1.330132e-02 2.869452e-02 9.085233e-02 2.768476e-03 1.857970e-03
##  [71] 1.857970e-03 5.764333e-06 1.624334e-04 1.238941e-07 1.624334e-04
##  [76] 1.857970e-03 1.956001e-02 5.764333e-06 6.100952e-03 1.371033e-01
##  [81] 1.857970e-03 7.108270e-05 5.541669e-04 2.264666e-01 1.330132e-02
##  [86] 8.311543e-04 1.956001e-02 6.160064e-02 1.857970e-03 6.160064e-02
##  [91] 6.100952e-03 1.244035e-03 9.020799e-03 1.330132e-02 2.264666e-01
##  [96] 2.167877e-12          Inf 1.956001e-02 4.202971e-02 6.100952e-03
## [101] 2.264666e-01 6.160064e-02          Inf          Inf 2.264666e-01
```

```
## [106] 9.085233e-02             Inf 6.160064e-02             Inf             Inf
## [111]             Inf 4.202971e-02 1.330132e-02 1.371033e-01 9.085233e-02
## [116] 4.202971e-02 2.768476e-03 6.100952e-03 6.100952e-03 9.085233e-02
## [121] 6.100952e-03 6.100952e-03 8.311543e-04 2.449578e-04 1.624334e-04
## [126] 2.035717e-05 3.393344e-08 4.691811e-05 2.797769e-10 1.426089e-08
## [131] 4.115094e-03 2.926450e-07 1.277186e-11 1.390101e-12 6.889568e-07
## [136] 1.614767e-09 1.987723e-11 1.008202e-14 3.379508e-12 4.533259e-18
## [141] 7.114771e-18 2.582213e-19 1.277186e-11 9.914929e-19 1.116291e-17
## [146] 3.379508e-12 2.588679e-16 7.473136e-11 3.654481e-13 1.735015e-20
## [151] 9.235810e-09 6.335368e-16 3.776591e-15 2.049619e-26 1.389975e-40
## [156] 2.210830e-40 5.379158e-42 3.193932e-25 1.814215e-33 1.193923e-22
## [161] 4.477907e-21 7.198735e-30 1.879959e-22 1.125286e-28 2.049619e-26
## [166] 1.822108e-32 2.787697e-36 2.246376e-39 7.684732e-46 1.081648e-26
## [171] 5.492266e-41 1.799753e-34 2.268571e-49 2.896931e-55 7.402762e-55
## [176] 7.664675e-88 6.134002e-200 5.097666e-217 2.056380e-141 4.217266e-153
## [181] 2.496660e-139 3.589207e-132 1.407654e-162 4.592692e-178 1.452876e-154
## [186] 3.323310e-141 8.334012e-168 3.874992e-211 5.132356e-256 1.142858e-164
## [191] 1.349109e-167  0.000000e+00 2.333095e-200 2.526000e-161 1.194533e-296
## [196] 1.724383e-181 1.453953e-157 7.715644e-271 2.695851e-165 1.571179e-227
## [201] 2.466795e-234 1.052665e-283 1.958186e-252 1.958186e-252 3.584347e-295
## [206] 2.610047e-268 7.624911e-230 7.369571e-257 5.552651e-303 9.463754e-281
## [211] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [216] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [221] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [226] 1.774204e-275 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [231] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [236] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [241] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [246] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [251] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [256] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [261] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [266] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [271] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [276] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [281] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [286] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [291] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [296] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [301] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [306] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [311] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [316] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [321] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [326] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [331] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [336] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [341] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [346] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [351] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [356] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [361] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [366] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [371] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
```

```
## [376]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [411]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [416]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [421]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [426]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [431]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [436]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```r
dchisq(df$Deceased, df=1, ncp = 1, log = FALSE)
```

```
##    [1]         Inf         Inf         Inf         Inf         Inf
##    [6]         Inf         Inf         Inf         Inf         Inf
##   [11]         Inf         Inf         Inf         Inf         Inf
##   [16]         Inf         Inf         Inf         Inf         Inf
##   [21]         Inf         Inf         Inf         Inf         Inf
##   [26]         Inf         Inf         Inf         Inf         Inf
##   [31]         Inf         Inf         Inf         Inf         Inf
##   [36]         Inf         Inf         Inf         Inf         Inf
##   [41]         Inf         Inf         Inf         Inf         Inf
##   [46]         Inf         Inf         Inf         Inf         Inf
##   [51]         Inf         Inf         Inf         Inf         Inf
##   [56]         Inf         Inf         Inf 2.264666e-01         Inf
##   [61]         Inf 2.264666e-01         Inf         Inf         Inf
##   [66]         Inf         Inf         Inf         Inf         Inf
##   [71]         Inf         Inf         Inf         Inf         Inf
##   [76]         Inf         Inf         Inf         Inf         Inf
```

```
##  [81]          Inf          Inf          Inf          Inf          Inf
##  [86] 2.264666e-01          Inf          Inf          Inf          Inf
##  [91]          Inf          Inf          Inf          Inf          Inf
##  [96]          Inf          Inf          Inf          Inf          Inf
## [101]          Inf          Inf          Inf          Inf          Inf
## [106]          Inf          Inf          Inf          Inf          Inf
## [111]          Inf          Inf          Inf 2.264666e-01          Inf
## [116] 2.264666e-01 2.264666e-01          Inf          Inf 2.264666e-01
## [121] 2.264666e-01 2.264666e-01 2.264666e-01          Inf 2.264666e-01
## [126]          Inf 9.085233e-02          Inf 2.264666e-01          Inf
## [131] 2.264666e-01          Inf 2.264666e-01 2.264666e-01 2.264666e-01
## [136]          Inf          Inf 2.264666e-01          Inf          Inf
## [141] 2.264666e-01          Inf          Inf          Inf          Inf
## [146] 2.264666e-01          Inf          Inf          Inf          Inf
## [151]          Inf 2.264666e-01 2.264666e-01 2.264666e-01          Inf
## [156]          Inf          Inf          Inf 1.371033e-01          Inf
## [161]          Inf          Inf          Inf 1.371033e-01 1.371033e-01
## [166] 1.371033e-01 2.264666e-01 2.264666e-01 1.371033e-01 2.264666e-01
## [171] 1.371033e-01 1.371033e-01 2.264666e-01 2.264666e-01 2.264666e-01
## [176] 4.202971e-02 6.160064e-02 4.202971e-02 1.371033e-01 1.371033e-01
## [181] 6.160064e-02 2.264666e-01 1.371033e-01 9.085233e-02 1.330132e-02
## [186] 2.264666e-01 1.371033e-01 9.085233e-02 1.956001e-02 9.085233e-02
## [191] 4.202971e-02 6.160064e-02 1.371033e-01 1.956001e-02 4.202971e-02
## [196] 2.869452e-02 9.085233e-02 6.100952e-03 1.956001e-02 6.100952e-03
## [201] 1.857970e-03 2.869452e-02 1.956001e-02 9.020799e-03 2.768476e-03
## [206] 8.311543e-04 4.202971e-02 4.115094e-03 6.100952e-03 1.857970e-03
## [211] 6.100952e-03 1.956001e-02 2.869452e-02 1.956001e-02 1.956001e-02
## [216] 6.160064e-02 1.956001e-02 6.100952e-03 4.115094e-03 4.115094e-03
## [221] 6.100952e-03 2.768476e-03 1.857970e-03 2.768476e-03 2.768476e-03
## [226] 1.244035e-03 8.311543e-04 1.244035e-03 8.311543e-04 2.768476e-03
## [231] 1.244035e-03 9.020799e-03 2.768476e-03 2.449578e-04 5.541669e-04
## [236] 2.449578e-04 1.624334e-04 1.075359e-04 7.108270e-05 4.691811e-05
## [241] 7.108270e-05 7.108270e-05 1.075359e-04 4.691811e-05 3.092539e-05
## [246] 2.471840e-06 1.075359e-04 4.691811e-05 3.092539e-05 3.092539e-05
## [251] 1.338363e-05 4.691811e-05 2.035717e-05 1.338363e-05 3.092539e-05
## [256] 1.338363e-05 4.691811e-05 7.108270e-05 1.075359e-04 3.092539e-05
## [261] 2.035717e-05 8.788406e-06 4.691811e-05 7.108270e-05 2.035717e-05
## [266] 8.788406e-06 3.092539e-05 8.788406e-06 1.338363e-05 8.788406e-06
## [271] 1.075359e-04 2.035717e-05 5.764333e-06 8.788406e-06 3.776700e-06
## [276] 5.764333e-06 3.776700e-06 7.108270e-05 8.788406e-06 3.776700e-06
## [281] 8.788406e-06 5.764333e-06 3.776700e-06 2.035717e-05 4.691811e-05
## [286] 3.776700e-06 2.471840e-06 1.338363e-05 8.788406e-06 8.788406e-06
## [291] 7.108270e-05 1.624334e-04 5.764333e-06 3.776700e-06 8.788406e-06
## [296] 3.776700e-06 1.338363e-05 5.764333e-06 4.691811e-05 2.035717e-05
## [301] 8.788406e-06 5.764333e-06 3.092539e-05 1.338363e-05 5.764333e-06
## [306] 7.108270e-05 8.788406e-06 3.776700e-06 1.055706e-06 2.471840e-06
## [311] 6.889568e-07 3.776700e-06 3.092539e-05 1.055706e-06 1.904888e-07
## [316] 8.788406e-06 2.471840e-06 6.889568e-07 2.471840e-06 2.035717e-05
## [321] 4.492139e-07 5.764333e-06 5.764333e-06 3.092539e-05 2.471840e-06
## [326] 1.616186e-06 5.764333e-06 5.764333e-06 4.691811e-05 4.691811e-05
## [331] 5.541669e-04 7.108270e-05 1.338363e-05 1.244035e-03 2.035717e-05
## [336] 3.776700e-06 1.616186e-06 3.092539e-05 7.108270e-05 1.338363e-05
## [341] 1.624334e-04 2.035717e-05 1.338363e-05 1.338363e-05 3.092539e-05
## [346] 4.691811e-05 3.092539e-05 1.075359e-04 1.338363e-05 8.788406e-06
```

```
## [351] 1.624334e-04 3.092539e-05 5.764333e-06 7.108270e-05 3.687747e-04
## [356] 8.788406e-06 2.449578e-04 7.108270e-05 1.624334e-04 3.092539e-05
## [361] 1.075359e-04 3.687747e-04 1.624334e-04 1.075359e-04 1.624334e-04
## [366] 4.691811e-05 2.449578e-04 7.108270e-05 3.687747e-04 5.541669e-04
## [371] 1.075359e-04 3.687747e-04 1.624334e-04 5.541669e-04 1.624334e-04
## [376] 5.541669e-04 1.624334e-04 2.449578e-04 5.541669e-04 2.449578e-04
## [381] 5.541669e-04 8.311543e-04 1.857970e-03 2.449578e-04 5.541669e-04
## [386] 1.244035e-03 8.311543e-04 1.857970e-03 8.311543e-04 5.541669e-04
## [391] 1.244035e-03 3.687747e-04 1.244035e-03 1.244035e-03 2.449578e-04
## [396] 8.311543e-04 1.857970e-03 5.541669e-04 8.311543e-04 1.244035e-03
## [401] 5.541669e-04 5.541669e-04 1.857970e-03 2.768476e-03 5.541669e-04
## [406] 1.244035e-03 1.857970e-03 1.244035e-03 2.768476e-03 8.311543e-04
## [411] 4.115094e-03 8.311543e-04 1.857970e-03 8.311543e-04 3.687747e-04
## [416] 8.311543e-04 1.857970e-03 2.768476e-03 6.100952e-03 6.100952e-03
## [421] 2.768476e-03 1.244035e-03 1.244035e-03 2.768476e-03 4.115094e-03
## [426] 5.541669e-04 8.311543e-04 4.115094e-03 1.244035e-03 2.768476e-03
## [431] 6.100952e-03 2.768476e-03 1.244035e-03 5.541669e-04 2.449578e-04
## [436] 4.691811e-05 3.687747e-04 5.541669e-04 4.115094e-03 1.075359e-04
## [441] 4.691811e-05 1.075359e-04 7.108270e-05 5.764333e-06 1.338363e-05
## [446] 7.108270e-05 3.776700e-06 4.691811e-05 3.776700e-06 5.764333e-06
## [451] 1.338363e-05 1.616186e-06 3.776700e-06 6.889568e-07 1.426089e-08
## [456] 6.728612e-10 4.339920e-10 6.728612e-10 4.339920e-10 2.499409e-09
## [461] 1.277186e-11 8.202896e-12 8.903928e-13 4.808225e-11 5.705370e-13
## [466] 9.583457e-14 3.654481e-13 6.335368e-16 4.044988e-19 1.647830e-19
## [471] 9.914929e-19 2.582213e-19 7.114771e-18 1.750881e-17 1.647830e-19
## [476] 1.879959e-22 1.279722e-25 1.778130e-28 2.827165e-35 9.111565e-38
## [481] 2.246376e-39 1.779268e-35 2.874722e-30 2.787697e-36 5.673642e-39
## [486] 8.889492e-40 2.296236e-37 7.135078e-35 5.673642e-39 8.367465e-43
## [491] 1.147154e-30 4.348022e-27 5.379158e-42 1.225730e-45 2.122026e-42
## [496] 7.964899e-25 2.887955e-31 5.673642e-39 1.133275e-34 2.857792e-34
## [501] 2.169145e-41 2.889026e-32 2.878699e-33 1.801332e-29 1.116291e-17
## [506] 4.533259e-18 4.811733e-23 1.879959e-22 6.334089e-19 2.809150e-28
## [511] 4.549523e-30 2.755783e-27 1.228832e-23 1.228832e-23 1.390101e-12
## [516] 4.657496e-22 7.035310e-21 1.778130e-28 7.964899e-25 2.848647e-29
## [521] 4.348022e-27 2.418445e-15 1.735015e-20 1.778130e-28 1.138848e-29
## [526] 1.778130e-28 5.123435e-26 7.327908e-22 1.647830e-19 4.273430e-20
## [531] 7.964899e-25 1.279722e-25 1.750881e-17 5.123435e-26 7.580420e-23
## [536] 2.588679e-16 8.202896e-12 7.035310e-21 4.477907e-21 1.984577e-24
## [541] 2.049619e-26 1.051189e-19 2.339972e-13 4.348022e-27 2.887955e-31
## [546] 3.240845e-26 1.279722e-25 3.053535e-23 4.050488e-16 1.987723e-11
## [551] 1.228832e-23 1.138848e-29
```

```r
pchisq(df$Confirmed, df=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.4772499 0.4772499 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.9261187 0.9661928 0.0000000
##  [43] 0.6527565 0.7647841 0.0000000 0.6527565 0.7647841 0.0000000 0.0000000
##  [50] 0.4772499 0.9931281 0.9931281 0.9979664 0.9999911 0.9969424 0.9772182
##  [57] 0.9996087 0.9999999 0.9261187 0.9997418 0.9999984 0.9499592 0.9999517
##  [64] 0.9998299 0.9772182 0.9897300 0.9661928 0.9954116 0.9661928 0.9772182
##  [71] 0.9931281 0.9499592 0.9846859 0.6527565 0.7647841 0.9661928 0.4772499
```

```
##  [78] 0.9499592 0.4772499 0.8399948 0.6527565 0.9261187 0.9996087 0.9897300
##  [85] 0.9846859 0.7647841 0.9499592 0.9897300 0.9954116 0.8399948 0.9846859
##  [92] 0.6527565 0.0000000 0.6527565 0.0000000 0.0000000 0.7647841 0.0000000
##  [99] 0.0000000 0.4772499 0.6527565 0.9499592 0.9499592 0.8911774 0.9846859
## [106] 0.9999793 0.9986498 0.9897300 0.9969424 0.9999942 0.9931281 0.9999517
## [113] 0.9999517 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pchisq(df$Recovered, df=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##    [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [57] 0.0000000 0.7647841 0.9661928 0.8399948 0.0000000 0.8399948 0.6527565
##   [64] 0.6527565 0.9969424 0.9661928 0.9261187 0.7647841 0.9931281 0.9954116
##   [71] 0.9954116 0.9999864 0.9996087 0.9999997 0.9996087 0.9954116 0.9499592
##   [78] 0.9999864 0.9846859 0.6527565 0.9954116 0.9998299 0.9986498 0.4772499
##   [85] 0.9661928 0.9979664 0.9499592 0.8399948 0.9954116 0.8399948 0.9846859
##   [92] 0.9969424 0.9772182 0.9661928 0.4772499 1.0000000 0.0000000 0.9499592
##   [99] 0.8911774 0.9846859 0.4772499 0.8399948 0.0000000 0.0000000 0.4772499
##  [106] 0.7647841 0.0000000 0.8399948 0.0000000 0.0000000 0.0000000 0.8911774
##  [113] 0.9661928 0.6527565 0.7647841 0.8911774 0.9931281 0.9846859 0.9846859
##  [120] 0.7647841 0.9846859 0.9846859 0.9979664 0.9994078 0.9996087 0.9999517
##  [127] 0.9999999 0.9998880 1.0000000 1.0000000 0.9897300 0.9999993 1.0000000
##  [134] 1.0000000 0.9999984 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pchisq(df$Deceased, df=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.0000000 0.4772499 0.0000000 0.0000000 0.4772499 0.0000000
##  [64] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [71] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
```

```
##   [78] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [85] 0.0000000 0.4772499 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [92] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [99] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [106] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [113] 0.0000000 0.4772499 0.0000000 0.4772499 0.4772499 0.0000000 0.0000000
##  [120] 0.4772499 0.4772499 0.4772499 0.4772499 0.0000000 0.4772499 0.0000000
##  [127] 0.7647841 0.0000000 0.4772499 0.0000000 0.4772499 0.0000000 0.4772499
##  [134] 0.4772499 0.4772499 0.0000000 0.0000000 0.4772499 0.0000000 0.0000000
##  [141] 0.4772499 0.0000000 0.0000000 0.0000000 0.0000000 0.4772499 0.0000000
##  [148] 0.0000000 0.0000000 0.0000000 0.0000000 0.4772499 0.4772499 0.4772499
##  [155] 0.0000000 0.0000000 0.0000000 0.0000000 0.6527565 0.0000000 0.0000000
##  [162] 0.0000000 0.0000000 0.6527565 0.6527565 0.6527565 0.4772499 0.4772499
##  [169] 0.6527565 0.4772499 0.6527565 0.6527565 0.4772499 0.4772499 0.4772499
##  [176] 0.8911774 0.8399948 0.8911774 0.6527565 0.6527565 0.8399948 0.4772499
##  [183] 0.6527565 0.7647841 0.9661928 0.4772499 0.6527565 0.7647841 0.9499592
##  [190] 0.7647841 0.8911774 0.8399948 0.6527565 0.9499592 0.8911774 0.9261187
##  [197] 0.7647841 0.9846859 0.9499592 0.9846859 0.9954116 0.9261187 0.9499592
##  [204] 0.9772182 0.9931281 0.9979664 0.8911774 0.9897300 0.9846859 0.9954116
##  [211] 0.9846859 0.9499592 0.9261187 0.9499592 0.9499592 0.8399948 0.9499592
##  [218] 0.9846859 0.9897300 0.9897300 0.9846859 0.9931281 0.9954116 0.9931281
##  [225] 0.9931281 0.9969424 0.9979664 0.9969424 0.9979664 0.9931281 0.9969424
##  [232] 0.9772182 0.9931281 0.9994078 0.9986498 0.9994078 0.9996087 0.9997418
##  [239] 0.9998299 0.9998880 0.9998299 0.9998299 0.9997418 0.9998880 0.9999264
##  [246] 0.9999942 0.9997418 0.9998880 0.9999264 0.9999264 0.9999683 0.9998880
##  [253] 0.9999517 0.9999683 0.9999264 0.9999683 0.9998880 0.9998299 0.9997418
##  [260] 0.9999264 0.9999517 0.9999793 0.9998880 0.9998299 0.9999517 0.9999793
##  [267] 0.9999264 0.9999793 0.9999683 0.9999793 0.9997418 0.9999517 0.9999864
##  [274] 0.9999793 0.9999911 0.9999864 0.9999911 0.9998299 0.9999793 0.9999911
##  [281] 0.9999793 0.9999864 0.9999911 0.9999517 0.9998880 0.9999911 0.9999942
##  [288] 0.9999683 0.9999793 0.9999793 0.9998299 0.9996087 0.9999864 0.9999911
##  [295] 0.9999793 0.9999911 0.9999683 0.9999864 0.9998880 0.9999517 0.9999793
##  [302] 0.9999864 0.9999264 0.9999683 0.9999864 0.9998299 0.9999793 0.9999911
##  [309] 0.9999975 0.9999942 0.9999984 0.9999911 0.9999264 0.9999975 0.9999996
##  [316] 0.9999793 0.9999942 0.9999984 0.9999942 0.9999517 0.9999990 0.9999864
##  [323] 0.9999864 0.9999264 0.9999942 0.9999962 0.9999864 0.9999864 0.9998880
##  [330] 0.9998880 0.9986498 0.9998299 0.9999683 0.9969424 0.9999517 0.9999911
##  [337] 0.9999962 0.9999264 0.9998299 0.9999683 0.9996087 0.9999517 0.9999683
##  [344] 0.9999683 0.9999264 0.9998880 0.9999264 0.9997418 0.9999683 0.9999793
##  [351] 0.9996087 0.9999264 0.9999864 0.9998299 0.9991051 0.9999793 0.9994078
##  [358] 0.9998299 0.9996087 0.9999264 0.9997418 0.9991051 0.9996087 0.9997418
##  [365] 0.9996087 0.9998880 0.9994078 0.9998299 0.9991051 0.9986498 0.9997418
##  [372] 0.9991051 0.9996087 0.9986498 0.9996087 0.9986498 0.9996087 0.9994078
##  [379] 0.9986498 0.9994078 0.9986498 0.9979664 0.9954116 0.9994078 0.9986498
##  [386] 0.9969424 0.9979664 0.9954116 0.9979664 0.9986498 0.9969424 0.9991051
##  [393] 0.9969424 0.9969424 0.9994078 0.9979664 0.9954116 0.9986498 0.9979664
##  [400] 0.9969424 0.9986498 0.9986498 0.9954116 0.9931281 0.9986498 0.9969424
##  [407] 0.9954116 0.9969424 0.9931281 0.9979664 0.9897300 0.9979664 0.9954116
##  [414] 0.9979664 0.9991051 0.9979664 0.9954116 0.9931281 0.9846859 0.9846859
##  [421] 0.9931281 0.9969424 0.9969424 0.9931281 0.9897300 0.9986498 0.9979664
##  [428] 0.9897300 0.9969424 0.9931281 0.9846859 0.9931281 0.9969424 0.9986498
##  [435] 0.9994078 0.9998880 0.9991051 0.9986498 0.9897300 0.9997418 0.9998880
##  [442] 0.9997418 0.9998299 0.9999864 0.9999683 0.9998299 0.9999911 0.9998880
##  [449] 0.9999911 0.9999864 0.9999683 0.9999962 0.9999911 0.9999984 1.0000000
```

```
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
qchisq(df$Confirmed, df=1, ncp = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qchisq(df$Confirmed, df = 1, ncp = 1, lower.tail = TRUE, log.p =
## FALSE): NaNs produced
```

```
##   [1]   0   0   0 Inf Inf   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0 Inf NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN Inf NaN Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0 Inf NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN   0 NaN NaN   0 NaN NaN   0 NaN NaN Inf NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
rchisq(df$Recovered, df=1, ncp = 1)
```

```
##   [1] 6.275636e+00 8.055403e-01 9.081058e-01 1.658425e-01 7.513065e+00
##   [6] 2.541246e+00 6.235338e+00 1.578681e+00 2.198706e+00 6.750434e+00
```

```
##  [11] 1.602163e+00 1.882181e-01 1.828652e-01 1.343458e+00 9.746279e+00
##  [16] 7.305973e-03 7.121306e-01 1.782735e+00 4.739903e-01 7.983157e-01
##  [21] 3.063888e+00 1.045351e+00 8.954850e-02 1.416290e-01 2.807750e-01
##  [26] 2.298728e+00 2.094752e+00 2.734497e-01 9.819778e-01 1.664107e+00
##  [31] 4.628959e+00 3.542313e+00 3.408648e+00 2.412470e-01 2.433997e+00
##  [36] 7.346909e-02 4.994107e-01 3.506182e-01 3.081124e-01 4.330360e+00
##  [41] 8.748313e+00 9.100317e-01 5.534616e-01 2.989074e+00 9.548826e-01
##  [46] 5.521454e-01 3.583280e-01 1.224129e+00 5.442696e-01 1.807056e+00
##  [51] 2.538695e-01 3.220933e-01 5.668313e-01 3.441968e-01 1.556546e+00
##  [56] 1.023522e+01 1.057816e-01 1.441190e-01 1.228170e+00 1.516248e+00
##  [61] 1.158053e+00 3.785628e+00 1.668371e+00 8.965380e-02 5.266248e-01
##  [66] 2.580549e+00 1.017492e+00 4.801204e-03 2.547246e-02 3.353000e+00
##  [71] 1.613362e+00 6.723123e+00 2.050804e+00 4.800479e-01 1.871162e+00
##  [76] 3.891799e+00 1.086036e+00 3.437732e+00 5.847564e-01 2.126870e+00
##  [81] 5.733991e-01 2.118070e-01 9.193987e+00 1.723109e+00 1.610096e+00
##  [86] 9.206556e-01 8.649874e+00 1.558491e+00 1.031134e+00 6.121290e-01
##  [91] 1.046731e-04 4.897906e+00 2.709265e-01 4.413057e-01 5.780284e-03
##  [96] 6.171479e-01 8.843805e+00 2.599157e-01 1.196644e-01 1.011868e+00
## [101] 5.992589e+00 2.483097e-01 2.460521e-02 1.494078e+00 7.086743e+00
## [106] 1.559321e+00 8.961102e-01 3.340748e-02 4.717503e+00 4.352032e+00
## [111] 3.114632e-01 2.666318e+00 7.805189e-01 4.252215e+00 2.951652e+00
## [116] 1.009283e+01 2.980528e-05 4.248631e-03 7.993092e-01 4.905166e-02
## [121] 1.008158e+00 7.323557e-01 1.832430e+00 1.880766e+00 5.110936e-02
## [126] 2.132227e-02 1.577122e+00 2.288481e+00 1.643567e+00 1.073876e+00
## [131] 1.630699e-01 2.926609e-01 4.609152e+00 4.523362e-02 4.053194e-01
## [136] 4.582781e+00 2.764916e+00 1.178962e+01 1.082085e-01 6.006033e+00
## [141] 2.894070e+00 1.045437e+00 2.007426e-01 8.872733e+00 5.252311e+00
## [146] 3.058337e-02 1.676327e-02 1.105620e-02 4.506126e+00 3.772892e+00
## [151] 2.540058e+00 4.862353e-01 5.274676e+00 4.298818e+00 7.077078e-02
## [156] 1.289942e-05 6.233399e+00 3.007335e+00 3.842763e+00 7.095893e-01
## [161] 1.165869e+00 2.723695e+00 2.240583e-01 3.789036e-03 7.257573e-01
## [166] 1.462966e-01 4.354494e+00 1.642773e-01 4.950870e-01 1.818662e+00
## [171] 6.765427e-01 4.713285e-01 8.428255e-01 1.354185e+01 7.613815e-02
## [176] 4.805451e+00 3.676481e+00 3.591376e-02 9.045784e+00 9.000230e+00
## [181] 4.270637e+00 4.601788e-01 6.670011e-01 1.499550e+00 3.601279e+00
## [186] 9.257921e-01 1.079991e+00 1.569276e+00 5.048443e-01 1.132674e+00
## [191] 3.752371e-01 2.034396e-05 6.153449e-02 2.403783e-02 7.896331e-01
## [196] 1.375908e-02 2.502702e+00 2.913380e+00 2.789183e+00 8.501146e-02
## [201] 1.020558e+00 1.010889e+01 1.895298e-01 2.184233e+00 5.429945e+00
## [206] 4.579143e-01 2.683847e+00 2.590954e+00 1.465589e-01 9.984264e+00
## [211] 3.811821e+00 5.556852e-01 3.616739e-01 5.299454e+00 1.147201e+00
## [216] 1.869597e-02 2.449531e-01 3.833164e+00 9.997948e-02 4.657200e-01
## [221] 3.160115e-01 4.326851e+00 3.291337e-01 9.315833e-01 3.680922e-01
## [226] 2.708175e+00 4.891424e+00 2.694801e+00 6.781032e-01 2.622539e-02
## [231] 5.593410e-02 2.649882e+00 2.565158e-03 5.069598e+00 1.043829e+00
## [236] 2.879571e-01 7.841910e+00 4.484190e+00 5.521780e+00 5.350069e-01
## [241] 5.203183e-01 1.057650e+00 2.805095e+00 1.442612e+00 5.245303e-01
## [246] 4.395853e+00 1.744226e-01 2.657165e+00 2.795944e-01 1.344181e-01
## [251] 2.989025e-01 1.404057e-02 1.486528e+00 1.084715e+00 1.818854e+00
## [256] 2.445001e-02 7.777743e-02 2.678950e-01 9.169403e-05 6.151873e+00
## [261] 1.188092e+00 8.224877e-02 1.068110e+00 7.007498e-01 7.421553e-02
## [266] 3.910981e+00 8.969678e-01 4.284069e-03 1.221284e-02 1.552056e+00
## [271] 5.667022e+00 2.752830e+00 1.058272e+01 1.079128e-01 3.397413e-01
## [276] 4.453807e+00 3.488901e-01 2.351587e-02 4.224785e+00 1.341119e-01
```

```
## [281] 3.608585e+00 4.234640e-01 5.426387e-01 1.871405e+00 4.748672e+00
## [286] 1.565971e-02 4.504191e-01 1.888241e-01 2.740324e-02 1.426802e-01
## [291] 6.176789e+00 1.451026e-02 9.354476e-01 2.947362e+00 5.353257e+00
## [296] 1.579640e-01 4.469052e-01 3.785724e-01 1.332894e-01 8.898977e-02
## [301] 2.321570e-01 4.455168e+00 2.097446e+00 1.127488e-03 1.075246e-02
## [306] 2.980738e+00 2.978784e-01 2.684449e-01 1.184205e-01 1.264418e+00
## [311] 8.079654e-01 2.332615e+00 6.611126e+00 1.207803e+00 2.007693e+00
## [316] 7.556142e+00 2.458124e+00 2.153579e+00 1.899445e+00 3.393170e+00
## [321] 4.465805e+00 4.304242e-01 1.815276e-02 8.547325e+00 2.145307e+00
## [326] 1.982771e+00 2.629565e+00 4.315849e-02 2.565986e+00 1.331144e-01
## [331] 8.818582e-01 2.032879e+00 8.032046e+00 6.739008e-01 2.233651e+00
## [336] 2.630253e+00 2.797353e+00 6.416648e-01 2.025307e+00 5.623833e+00
## [341] 5.230526e+00 5.913484e-02 1.944851e-02 2.700767e+00 4.570275e-03
## [346] 1.049569e-03 3.008543e+00 3.067854e+00 2.600371e+00 1.387822e+00
## [351] 7.019053e-02 3.426726e+00 1.908267e-02 1.143392e+00 4.098128e+00
## [356] 3.419138e-01 2.184010e+00 1.837559e-02 1.478497e-01 1.834057e+00
## [361] 1.472410e+00 5.272041e+00 1.641711e-01 1.916061e-01 1.850890e+00
## [366] 1.457092e-02 8.601747e+00 3.151502e-01 1.006888e-01 1.019050e+00
## [371] 4.796747e+00 1.629440e-02 4.092711e-01 3.142386e+00 1.683517e-01
## [376] 4.131332e-01 2.959163e-01 5.258435e-02 3.592054e+00 3.750772e+00
## [381] 4.110127e-01 1.526483e+00 1.695230e-01 1.762797e-01 1.568057e+00
## [386] 5.604303e+00 7.368674e-01 2.230702e+00 7.555289e-01 2.308340e-01
## [391] 4.296294e-01 2.230966e+00 1.236579e-01 6.666725e+00 1.180843e+00
## [396] 1.117053e+00 1.131672e-01 5.087416e-01 5.629781e-01 3.013315e-01
## [401] 5.510283e-01 1.665488e+00 1.012893e+00 3.942233e-01 3.593725e-03
## [406] 4.645819e+00 1.213525e+00 1.379600e-01 8.439047e-03 1.965074e-01
## [411] 6.898656e-01 1.398288e-01 3.254581e-01 3.085538e-01 1.474667e+00
## [416] 7.409330e-01 4.863061e-01 1.078417e-01 4.221585e-02 4.600961e+00
## [421] 2.953622e-02 5.596663e-04 5.317002e-03 6.801638e+00 3.730980e-01
## [426] 2.004630e+00 3.084064e+00 6.451691e-01 1.542072e+00 2.096123e+00
## [431] 2.121722e+00 2.131031e-01 6.793904e-01 6.931217e+00 3.050722e+00
## [436] 2.342586e+00 2.176763e+00 4.583990e-01 1.367697e-01 5.983204e+00
## [441] 1.527603e+00 1.550982e+00 5.353166e-01 6.753268e+00 5.057736e+00
## [446] 2.712963e+00 2.390126e+00 6.829288e+00 1.092437e+00 1.110083e+01
## [451] 1.129528e+00 7.896848e-01 4.186786e+00 1.968685e+00 1.956773e+00
## [456] 1.325418e-01 4.433119e+00 7.266229e-02 3.109173e-01 5.126182e+00
## [461] 5.662308e-03 7.490375e+00 4.250075e+00 3.982738e-01 5.456388e-02
## [466] 3.456976e-01 3.665594e-01 1.867294e-01 1.967386e+00 5.695795e-01
## [471] 4.139913e-02 1.835285e-01 3.822202e+00 1.154298e+00 6.691068e+00
## [476] 1.013336e-01 1.509955e+00 8.863512e-01 7.830778e-01 1.657538e+00
## [481] 1.096635e+00 3.699099e+00 2.216626e-01 1.945406e+00 1.157438e+00
## [486] 1.531756e+00 7.889861e-02 5.304196e-01 1.964264e-01 4.988421e+00
## [491] 1.920844e+00 2.830388e+00 2.395336e+00 9.703996e-01 2.123917e+00
## [496] 3.726365e-01 4.747200e-01 1.431451e+00 3.449680e+00 1.275918e+00
## [501] 1.874353e-01 4.315116e+00 5.621758e-01 1.468600e+00 5.956939e-01
## [506] 6.668610e-02 5.764192e+00 9.413877e-01 2.186156e+00 1.446156e-01
## [511] 1.253818e-01 2.051185e-01 4.373002e+00 5.137004e-01 4.204730e-02
## [516] 6.436844e-02 3.471186e+00 7.215335e+00 1.029668e+00 1.540182e+00
## [521] 2.645041e+00 8.123805e-02 1.273023e+00 5.045312e-01 1.567542e+00
## [526] 1.921997e-01 4.538074e-01 3.362970e+00 5.940071e-03 8.418817e-01
## [531] 6.752137e-01 7.593808e+00 1.039214e+00 2.886413e+00 8.040586e-02
## [536] 1.324366e+00 2.406816e-02 4.648436e+00 3.211908e-01 2.772303e-01
## [541] 1.861772e-02 8.633671e-02 8.707270e-03 4.400662e-01 2.641311e+00
## [546] 4.876085e-01 9.113177e-01 4.266261e-01 4.630967e-01 5.531176e+00
```

```
## [551] 3.445940e+00 1.141727e+00
```

```
rchisq(df$Confirmed, df=1)
```

```
##    [1] 2.972254e-02 6.991844e-03 3.883020e-01 3.994498e+00 1.672789e+00
##    [6] 3.898402e-02 4.622589e+00 2.150458e-01 1.797838e-02 2.438541e+00
##   [11] 5.367851e-02 2.327512e-01 1.763626e+00 4.241655e-01 4.321286e+00
##   [16] 1.433607e-01 1.285196e-01 4.303423e+00 3.041073e+00 2.455732e-02
##   [21] 2.823479e+00 1.823965e-02 7.842837e-02 1.553939e-01 1.134934e+00
##   [26] 7.232895e-01 1.593280e-01 3.721127e-04 4.222091e-01 6.212758e-02
##   [31] 3.954842e-02 2.696391e-01 3.172564e+00 4.406044e-01 5.863199e-02
##   [36] 6.035764e-01 2.202376e-01 1.254040e+00 1.436287e-01 1.436109e-01
##   [41] 5.675558e-01 2.821579e-01 4.728375e-01 6.316230e-02 1.135309e+00
##   [46] 1.797398e-01 1.534160e+00 4.415270e-01 8.504355e-04 1.206225e-01
##   [51] 8.125726e-01 2.690432e+00 9.128661e-05 3.226660e+00 1.991722e-01
##   [56] 6.874749e-01 1.464513e-03 2.449378e-03 1.484929e-01 2.691864e-02
##   [61] 6.190321e-01 3.651504e-01 6.238054e-01 4.436885e-01 9.777687e-01
##   [66] 3.068605e+00 2.402608e-01 8.570860e-01 5.346822e-01 6.422476e-01
##   [71] 2.633785e-03 1.925617e+00 1.081872e-02 5.675363e+00 6.732463e-01
##   [76] 2.644259e-01 1.970262e-01 6.357947e+00 7.167769e-02 2.050734e+00
##   [81] 7.735731e-04 4.394213e+00 9.897977e-05 1.814967e-01 3.378934e-01
##   [86] 6.933977e-02 5.723778e+00 4.113735e+00 1.119997e-01 6.652585e-02
##   [91] 1.705145e-01 4.170614e-01 4.731387e+00 4.681718e-01 4.993494e-02
##   [96] 3.005980e-01 2.495912e-02 1.112115e+00 1.191657e+00 1.026505e-01
##  [101] 1.235543e+00 3.929943e-01 4.538973e-01 2.405407e-01 3.118116e+00
##  [106] 8.270513e-01 1.645323e-03 1.865956e+00 1.821742e-02 4.054707e+00
##  [111] 9.187027e-01 1.186009e+00 8.177827e-02 2.508056e+00 2.744543e-01
##  [116] 4.541067e-01 8.397359e-02 1.117477e-01 6.903635e-01 1.189556e+00
##  [121] 4.638254e-02 1.947080e+00 2.898636e-01 1.936309e-01 3.586123e-01
##  [126] 3.279767e-02 1.123722e+00 1.458088e+00 1.405110e+01 4.345349e-02
##  [131] 4.004781e-01 2.373204e-01 2.271284e+00 1.259875e+00 3.447657e-02
##  [136] 4.998062e-01 1.874326e+00 4.376125e-03 1.030310e-01 4.240488e-02
##  [141] 2.182648e+00 2.662785e+00 3.385567e+00 5.060372e-03 9.039713e-01
##  [146] 1.176481e-01 9.053249e-02 1.687726e-01 2.148228e+00 4.236584e-01
##  [151] 8.096465e-01 1.000363e-01 1.363723e+00 2.744236e+00 4.563879e-02
##  [156] 3.048843e-01 3.490118e-01 2.005212e-01 5.580073e-01 2.448153e+00
##  [161] 5.701303e-01 4.483073e-01 2.002192e+00 1.282824e-02 8.638725e-01
##  [166] 1.435237e+00 1.356102e+00 2.682961e-01 4.315735e-01 2.895993e-01
##  [171] 7.612488e-02 1.067130e+00 7.166904e-01 2.327467e-01 2.203940e-01
##  [176] 1.256921e+00 2.368446e-02 2.511442e-01 5.155404e-01 6.671630e-01
##  [181] 7.294519e+00 3.586036e+00 1.243524e-02 9.860177e-01 1.231554e-02
##  [186] 5.397037e-02 1.389003e-02 4.852527e-01 1.507279e-01 1.244152e-02
##  [191] 7.072777e-02 5.297973e+00 1.500477e+00 8.158629e-04 7.666727e+00
##  [196] 2.828753e-01 1.664637e+00 2.170389e-01 2.215364e+00 5.738988e-01
##  [201] 2.090576e+00 7.768023e-01 4.965599e-02 2.412478e-01 2.067960e+00
##  [206] 4.007582e-01 6.068294e+00 1.194254e+00 4.671745e-02 2.327600e-01
##  [211] 5.608283e+00 5.009865e-02 1.315023e-01 4.318330e-01 4.245897e-01
##  [216] 1.151466e-01 7.328529e-01 1.201294e-03 6.615391e-02 2.433634e-01
##  [221] 3.673171e-01 1.699916e+00 1.212768e-01 3.385806e-02 5.802802e-02
##  [226] 3.799327e-01 4.875641e+00 4.037023e+00 8.277050e-02 5.385950e-01
##  [231] 3.527209e-02 4.073908e-02 2.555330e+00 2.689227e+00 2.431807e+00
##  [236] 1.494050e-01 1.054390e+00 1.793722e-01 3.046244e-01 2.611908e+00
##  [241] 1.004714e+00 1.869927e+00 3.714207e+00 3.177405e-02 3.673536e-01
##  [246] 7.415566e-03 2.370642e+00 1.381997e-01 6.960475e-01 1.010032e-01
##  [251] 6.536539e+00 7.281918e-02 4.642093e-01 7.310127e-02 4.488463e-02
```

```
## [256] 6.327201e-05 7.422278e-03 9.993181e-02 3.067649e+00 1.689580e+00
## [261] 2.266287e-01 5.077150e-02 2.072237e-03 7.200006e-01 9.117770e-02
## [266] 3.421895e-04 2.831465e-01 2.507050e+00 2.839840e+00 8.665448e-01
## [271] 3.781963e-02 9.994865e-01 3.731467e-01 1.324053e+00 9.555534e-01
## [276] 9.762459e-02 1.354158e-01 8.140339e-01 1.252856e+00 6.198744e-01
## [281] 1.531194e+00 6.966785e-01 3.369157e-01 1.852573e-01 1.179384e-01
## [286] 5.424947e-02 5.511138e-01 8.991134e-05 5.234476e-03 1.817943e-02
## [291] 5.505969e-01 1.062833e+00 9.289410e-02 1.385386e+00 6.089655e-01
## [296] 1.347577e+00 6.132683e+00 1.898853e+00 1.511274e+00 1.953937e-04
## [301] 2.175517e-01 2.149386e-01 6.017563e-02 3.447349e-02 3.196970e-01
## [306] 1.217274e+00 4.830720e-01 1.878031e-03 3.019950e-01 2.217517e+00
## [311] 9.731308e-03 5.082967e-01 5.700809e+00 1.353694e+00 5.606127e-01
## [316] 4.560450e+00 5.271037e+00 1.429816e-01 5.383370e-02 1.335852e+00
## [321] 6.631261e+00 1.777567e+00 7.594326e-01 2.878836e+00 2.667408e-01
## [326] 6.893553e-02 4.780999e-02 1.047805e-01 3.543018e-02 7.060399e-01
## [331] 1.349859e-02 6.149189e-02 1.414915e-01 4.653014e+00 1.065526e+00
## [336] 4.922150e-02 8.223957e-02 8.813285e-01 7.931495e-01 5.249640e-01
## [341] 1.666340e-01 5.435480e-01 7.004557e-02 2.186110e-01 1.818603e-02
## [346] 1.738876e-01 1.080458e+00 1.966484e+00 2.094969e-01 6.405772e-01
## [351] 3.513722e-01 4.861976e+00 6.644445e-01 3.992805e-02 6.744038e-02
## [356] 9.021313e-01 5.777544e-01 9.088077e-01 2.310758e-01 2.166126e+00
## [361] 1.571054e-01 1.125147e+00 3.986311e-02 1.808178e-01 1.529342e+00
## [366] 1.664296e-02 1.475169e+00 5.540170e-01 3.776333e+00 4.361683e-01
## [371] 3.367099e-02 1.838834e+00 3.296633e-01 1.309254e-01 6.814786e-01
## [376] 3.729571e+00 1.894231e-02 8.076349e-01 4.803033e-01 4.379459e-02
## [381] 1.200430e+00 2.314309e-03 3.503694e+00 2.684368e+00 1.375021e-01
## [386] 4.385367e-01 1.979902e-01 1.643962e-01 4.393877e-02 7.628402e-01
## [391] 2.787508e-03 7.940859e-02 5.380344e-02 2.118806e-01 8.562973e-01
## [396] 5.946141e-01 1.037660e+00 9.759026e-06 3.346416e-01 1.011928e+00
## [401] 1.468753e-01 7.011117e-01 4.117604e+00 2.836803e+00 1.122507e+00
## [406] 2.217556e+00 4.619803e+00 9.334695e-01 4.180509e+00 8.844859e-03
## [411] 1.019571e-01 1.803249e+00 3.501529e-03 5.022682e-01 1.381396e-03
## [416] 2.083518e-01 1.781566e+00 4.006121e-01 7.248438e+00 2.772244e-01
## [421] 2.894881e-01 7.082238e-01 3.950979e-01 3.700254e-01 2.137242e-01
## [426] 5.568947e-03 7.724519e-02 1.618800e-02 4.176357e-01 1.195609e+00
## [431] 1.864173e+00 2.690380e-01 3.318132e-02 9.540706e-01 3.440472e+00
## [436] 2.020931e-01 2.110339e+00 6.030889e-01 8.041447e-01 5.881469e-02
## [441] 2.229647e-02 1.558576e-01 1.017497e-01 2.481366e-01 4.892971e+00
## [446] 2.862129e+00 7.738573e-02 1.183730e+00 1.529199e+00 7.211672e-01
## [451] 1.477420e-02 2.638348e+00 3.263085e-02 6.292414e-01 4.175658e-01
## [456] 5.803119e-01 2.045603e-01 9.394510e-01 5.996696e-04 6.460596e-01
## [461] 2.600341e+00 1.127860e+00 2.809279e-01 2.927629e-02 1.095087e-01
## [466] 9.344227e-01 5.511072e-01 3.699895e-01 4.190793e-03 5.001009e-01
## [471] 2.118227e+00 5.177974e-01 2.741002e-02 3.312212e-02 2.118443e+00
## [476] 2.265933e+00 1.991138e+00 1.166429e+00 3.548470e-03 2.257534e+00
## [481] 8.343329e-02 6.694494e-01 9.783569e-02 1.482695e+00 2.898787e+00
## [486] 6.387071e-01 3.666414e+00 4.610842e+00 3.340235e-01 5.429014e-01
## [491] 6.866118e-01 4.716463e+00 1.418481e-04 5.121082e-01 8.236241e+00
## [496] 7.444479e-01 5.177577e+00 1.005123e+00 8.225098e-01 1.020371e-01
## [501] 4.182958e-02 8.501708e-01 1.980273e+00 1.626759e-01 1.351131e-02
## [506] 6.312837e+00 1.186070e-01 3.145135e+00 6.073155e-01 2.664000e-01
## [511] 6.717751e-02 2.126530e+00 1.608667e+00 2.095898e+00 1.842824e+00
## [516] 1.494399e-01 8.180638e-03 2.537886e+00 5.171485e-02 1.244146e-01
## [521] 8.776052e-01 1.385114e-01 3.454449e-01 4.618103e+00 1.899996e-01
```

```
## [526] 7.990165e-02 2.851254e-01 7.541090e-01 5.586754e-03 5.520354e-01
## [531] 2.383321e+00 3.287864e-02 2.627417e+00 3.641646e-01 5.400184e+00
## [536] 1.427560e-02 1.874083e+00 1.564792e-01 9.279963e-01 2.828691e-01
## [541] 5.495590e-01 2.179824e-04 2.491454e-01 7.072380e-01 7.170399e-02
## [546] 1.863444e+00 6.974298e-02 7.387539e-01 2.399280e-01 6.508236e-02
## [551] 3.376422e-02 1.996611e-01
```

```r
rchisq(df$Recovered,df=1)
```

```
##   [1] 5.856187e-03 2.823655e-01 8.017448e-01 4.829552e-03 3.226461e-04
##   [6] 4.900330e-02 4.176461e-02 1.532426e+00 1.252049e-01 3.846508e+00
##  [11] 1.104480e+00 2.187417e-01 4.878685e-01 1.330083e+00 1.939726e-02
##  [16] 1.017941e+00 1.677823e+00 4.524673e-01 1.276624e-03 2.616377e-01
##  [21] 9.199577e-01 2.750989e+00 8.995748e-01 1.517738e+00 9.991922e-01
##  [26] 1.037564e+00 5.270645e-01 1.144486e-01 1.267347e+00 1.106874e-01
##  [31] 7.918471e-02 4.448690e-02 1.658562e+00 1.076522e-02 3.358083e+00
##  [36] 1.906290e-02 3.535918e-03 4.062614e+00 6.867412e-01 2.200328e+00
##  [41] 6.102850e-01 1.599754e+00 7.689115e-03 6.788972e-02 1.110463e+00
##  [46] 1.688687e-02 3.302300e-02 9.222949e-03 3.703523e-01 7.650674e-01
##  [51] 1.304290e+00 1.480478e-02 3.505248e-02 1.033243e+00 1.801425e-01
##  [56] 2.162906e+00 1.737358e-02 1.293274e+00 3.555208e-01 1.987562e+00
##  [61] 4.522182e-03 1.498997e-02 2.226713e-02 3.669806e-05 1.083107e+00
##  [66] 1.107141e-05 2.234987e-04 1.819528e+00 3.120672e+00 7.580798e-01
##  [71] 1.470305e+00 2.252709e-03 8.244550e-01 3.637058e-01 1.725817e-01
##  [76] 4.966298e-01 4.152247e-02 8.519450e-01 6.977914e-01 1.562262e+00
##  [81] 2.977460e-01 1.932016e+00 9.829972e-02 1.418981e+00 1.244339e-01
##  [86] 2.091976e+00 4.690818e+00 1.170577e+00 1.823104e+00 1.395686e+00
##  [91] 2.561703e+00 1.879437e-02 1.353660e-01 2.095083e-01 1.262948e-02
##  [96] 2.128824e+00 1.945021e-02 2.772366e-02 1.079776e-03 1.455050e+00
## [101] 2.626076e-01 5.265321e-01 1.574208e+00 1.625377e-01 5.881550e+00
## [106] 1.279924e+00 1.686566e+00 2.766638e+00 1.147277e-02 4.553577e+00
## [111] 4.913412e-03 2.546139e+00 1.504694e-02 1.485766e+00 2.862755e+00
## [116] 5.055141e-01 4.157594e+00 2.124893e-01 9.767893e-03 1.573251e-01
## [121] 8.285350e-02 7.492188e-01 3.727257e+00 2.186920e+00 6.770009e-01
## [126] 1.197928e+00 3.762794e-02 2.781611e+00 4.611887e-01 1.310299e-01
## [131] 1.222995e-01 2.714453e+00 1.787150e+00 1.508468e-01 2.571212e-01
## [136] 7.017921e-01 6.402191e-01 1.959138e+00 5.516060e-01 1.539870e+00
## [141] 8.570036e-02 4.404414e+00 1.156840e+00 2.355992e-07 4.236654e-01
## [146] 1.384845e+00 9.366975e+00 4.226536e-01 2.857222e+00 6.798643e-01
## [151] 7.215575e-02 3.587877e-01 5.365512e-01 7.237969e-01 6.886762e-01
## [156] 1.138065e+00 4.610036e-01 3.258751e-01 2.134440e+00 5.611525e-01
## [161] 6.016763e-01 2.734520e+00 1.806278e+00 3.282869e-01 2.946277e-02
## [166] 2.463603e-01 1.752257e-01 4.563717e-02 5.275401e+00 3.317913e-02
## [171] 2.314766e-01 3.001266e-01 7.272075e-02 3.421125e+00 3.519295e+00
## [176] 7.653277e-02 2.611292e+00 8.157291e-03 9.642119e-01 8.818970e-01
## [181] 1.325614e+00 9.372923e-01 1.403791e-01 1.441135e+00 7.730036e-01
## [186] 1.269842e+00 3.667399e-01 4.475871e-01 4.469701e-01 9.420784e+00
## [191] 2.527412e-01 1.987437e+00 1.594455e-01 5.536678e-01 1.183268e-01
## [196] 5.049896e-01 8.362008e-02 1.184412e+00 1.501123e+00 1.088013e-03
## [201] 1.619022e+00 4.399760e-02 1.573440e+00 4.198366e-01 8.006441e-01
## [206] 4.046350e-04 1.199993e-01 4.885381e-01 1.273612e-01 3.802606e+00
## [211] 1.529668e+00 1.324491e+00 5.131420e-01 1.876392e+00 1.401433e-01
## [216] 9.948668e-01 3.875420e-02 2.951580e-01 5.063801e-01 5.331723e-01
## [221] 1.484665e+00 9.109336e-02 3.983562e-02 2.186880e+00 9.318508e-01
## [226] 2.140725e+00 3.045886e+00 1.924045e+00 1.061655e+00 1.085413e-01
```

```
## [231] 3.955684e-01 7.737860e-01 1.278497e+00 8.423987e+00 1.332225e+00
## [236] 2.691889e-01 1.387090e-01 4.761206e-01 1.840614e-01 8.365599e-01
## [241] 6.899035e-01 6.034902e-02 6.452461e-04 6.451755e-05 6.050686e-01
## [246] 3.754430e-02 1.726887e+00 4.343648e-01 2.869053e+00 1.810566e+00
## [251] 1.074440e+00 1.063221e+00 3.317855e-01 1.772585e+00 1.190277e-01
## [256] 1.790337e-01 3.058995e-01 1.076054e-02 6.283357e-01 2.227488e+00
## [261] 1.172662e+00 9.646253e-03 1.645788e-01 7.684350e-01 5.375179e-01
## [266] 8.655141e-03 5.401193e-01 5.617558e-01 6.194259e-01 3.215872e-01
## [271] 3.725880e-02 8.710141e-01 5.361781e-01 8.956115e-03 1.348404e-01
## [276] 1.264034e+00 1.393991e+00 2.453075e+00 2.394108e-01 2.606584e-01
## [281] 1.112898e+00 5.574312e-02 2.605323e-01 1.176516e-01 7.897253e-03
## [286] 1.419515e+00 5.154623e-02 3.750625e-02 3.404370e-01 6.910747e-01
## [291] 6.746886e-01 2.536391e-01 1.746928e-01 1.080135e+00 3.630943e-01
## [296] 1.001262e-01 1.818307e-01 4.181490e-01 2.612872e-01 2.146867e+00
## [301] 3.480810e-01 5.658933e-02 1.214614e+00 1.523092e-01 2.899023e+00
## [306] 8.131525e-02 1.751732e-01 3.156755e-02 3.899436e+00 4.470644e-01
## [311] 8.866637e-02 2.081579e+00 2.102686e-01 2.609410e-01 1.421967e-01
## [316] 1.084992e+00 8.967822e-01 1.072586e-01 5.414822e-01 2.348479e+00
## [321] 1.774812e-01 3.360864e-01 5.311752e-02 1.368305e-03 2.249642e+00
## [326] 6.400290e+00 1.955667e+00 1.724015e-01 1.408297e-02 2.855505e+00
## [331] 1.124888e-01 1.108576e+00 1.387256e+00 2.991140e-02 4.538170e-01
## [336] 9.097885e-02 8.198658e-03 2.821133e-01 5.196368e-01 1.439337e+00
## [341] 1.684618e+00 4.829284e-01 2.847148e+00 1.332115e-01 5.487426e-02
## [346] 1.172839e-01 3.548569e+00 4.645941e-03 3.673055e-01 6.064314e-02
## [351] 6.599988e-01 6.491442e-02 2.126921e-03 1.637739e-01 1.875590e+00
## [356] 7.541624e-01 1.845581e-01 7.538684e-04 3.548483e-01 1.173616e+00
## [361] 3.431957e-02 1.549303e+00 2.553041e+00 8.228895e-01 1.265396e+00
## [366] 2.327539e-01 3.277177e-02 3.231806e+00 1.805926e-01 4.530717e+00
## [371] 1.438586e-02 4.981586e+00 1.871652e-01 8.039757e-02 1.275070e-01
## [376] 7.140370e-01 1.251680e-01 2.752347e+00 2.650671e-02 2.625056e+00
## [381] 6.445122e-01 5.584666e-01 1.061334e+00 1.582288e-01 3.494072e-01
## [386] 9.013452e-01 2.750005e-02 6.045509e+00 1.036556e-01 8.733795e-02
## [391] 1.148618e+00 1.925694e-03 3.196911e+00 1.442095e+00 6.174587e+00
## [396] 6.974822e-02 2.364602e-01 3.295693e-01 2.560662e-01 1.805996e+00
## [401] 2.969883e+00 2.929179e-01 2.935886e-01 5.140084e-02 1.461138e-01
## [406] 1.618236e-01 1.376060e+00 7.024004e-01 8.864302e-01 1.321626e+00
## [411] 9.052234e-02 2.215446e-01 2.874329e+00 4.822855e-01 2.967066e+00
## [416] 6.742261e-01 4.297034e-03 4.970395e+00 6.383799e-01 1.996745e-01
## [421] 2.710928e-01 1.090077e+00 5.892791e-01 2.176950e-02 1.208608e+00
## [426] 9.679869e-02 5.737166e-04 7.307273e-01 3.580431e+00 1.320429e+00
## [431] 7.248175e-02 8.078881e-03 3.679729e-01 4.795726e-01 2.271052e+00
## [436] 2.771866e-02 3.192100e-01 2.395995e-01 2.827965e-02 1.604379e-01
## [441] 3.285406e+00 7.253458e-01 1.206661e+00 1.052169e-01 7.397806e-01
## [446] 1.043616e-01 5.137423e+00 2.621360e-02 2.769990e-01 2.162802e-02
## [451] 1.159854e+00 1.271143e+00 2.180284e-01 2.137776e-03 7.177505e-01
## [456] 3.747785e-02 9.632116e-01 6.021123e+00 1.700056e+00 1.880453e-01
## [461] 3.817565e+00 1.154761e+00 4.198393e+00 8.784095e-01 4.011266e-01
## [466] 2.135139e+00 1.510405e+00 1.111628e-01 5.995263e-01 1.258755e+00
## [471] 3.716952e-01 4.039804e-01 1.245938e-02 6.943629e-01 3.284539e-01
## [476] 1.536943e-01 3.612602e+00 3.554988e-01 2.096065e+00 3.722265e-01
## [481] 7.341103e-01 7.490889e-01 8.803571e-01 2.953783e+00 5.797262e-02
## [486] 3.766149e-01 1.248285e+00 2.261409e-03 1.697193e-03 4.707252e-01
## [491] 7.645731e-01 9.793989e-02 2.351555e-01 1.494764e+00 2.337983e+00
## [496] 6.690748e-01 1.190336e-02 6.091399e-01 2.245587e-02 2.959072e-05
```

```
## [501] 4.803511e-01 2.141712e+00 2.559547e-02 2.656290e-01 1.170569e+00
## [506] 7.805624e-01 3.609139e-01 4.334786e-01 1.435854e+00 5.176048e-01
## [511] 2.161567e+00 1.629064e-02 1.584274e-02 5.298043e-02 1.131237e+00
## [516] 9.385010e-02 8.628265e-02 1.161836e-01 3.128769e-01 3.164535e+00
## [521] 9.852317e-01 9.915977e-02 5.761160e-01 3.359118e+00 1.088009e-01
## [526] 8.685365e-01 8.801754e+00 8.068867e-01 4.528770e-01 4.054575e-01
## [531] 6.494289e-01 8.622588e-01 6.859180e-01 8.113857e-01 3.967108e-02
## [536] 9.836628e-02 1.055775e-01 5.613689e-01 1.609149e+00 1.322780e-01
## [541] 4.412715e+00 7.008997e+00 8.916155e-01 7.656856e-01 2.782410e+00
## [546] 1.223709e+00 1.308257e+00 4.282080e+00 7.917640e-01 4.464061e-02
## [551] 1.756313e+00 2.385895e+00
```

```r
rchisq(df$Deceased,df=1)
```

```
##    [1] 1.169737e+00 1.466371e+00 1.081685e+00 2.248886e+00 1.176379e+00
##    [6] 1.813567e+00 6.501082e-03 5.499661e-02 1.021358e-01 2.844795e+00
##   [11] 5.291621e-01 1.534746e+00 9.462358e-01 1.419149e+00 1.565914e+00
##   [16] 7.656489e-01 1.949094e+00 1.809884e+00 1.027936e+00 5.664581e-01
##   [21] 8.537700e-01 9.136881e-01 9.314849e-01 6.080074e-03 1.701112e-04
##   [26] 6.781452e-03 7.657340e-03 5.141716e-02 7.754635e-01 2.668107e+00
##   [31] 1.843108e-01 2.021524e-01 6.187628e-01 1.172209e+00 1.451443e-02
##   [36] 3.512861e-02 9.957608e-01 4.242571e-02 1.034138e+00 6.911401e-01
##   [41] 1.964433e+00 1.743434e+00 1.108429e+00 2.858294e-04 1.508996e-02
##   [46] 4.935009e-02 9.384003e-01 1.381460e+00 5.603743e-01 3.465778e-01
##   [51] 1.730360e-02 3.564043e+00 3.382376e+00 8.752824e-01 2.968535e+00
##   [56] 1.561614e+00 1.715781e-01 8.423056e-01 1.119789e-01 4.074513e-02
##   [61] 1.235543e+00 5.133720e-01 3.101704e+00 3.661747e+00 4.846825e-01
##   [66] 7.416640e-03 1.827015e-01 6.621628e-04 8.687567e-03 3.744176e-03
##   [71] 4.162425e-02 3.381417e-01 4.825082e-02 1.353640e+00 9.559392e-01
##   [76] 3.609317e+00 4.851838e-03 1.536965e-02 1.730270e-01 2.321262e-03
##   [81] 7.257634e-01 1.169313e-01 7.364437e-01 5.480179e-01 3.065580e+00
##   [86] 4.893745e-02 1.680299e+00 2.154183e+00 1.274740e-01 1.882191e+00
##   [91] 1.625680e-01 3.435655e+00 1.819587e-01 1.255126e+00 3.864119e-03
##   [96] 2.470236e-01 9.023200e-03 1.509397e-01 3.115221e-01 9.384737e-01
##  [101] 3.123544e-01 1.241086e+00 3.269783e-01 7.476080e+00 1.902797e-01
##  [106] 2.174621e+00 5.179416e-01 1.710340e+00 1.023563e+00 5.403532e-01
##  [111] 9.107642e-01 1.254714e+00 2.404079e+00 3.890174e-01 1.156938e+00
##  [116] 2.310647e-01 1.250367e+00 2.358897e-01 1.162901e-02 1.170209e+00
##  [121] 3.140068e-01 7.034371e-02 6.057356e-01 1.363905e+00 5.123805e-01
##  [126] 6.157122e-03 2.310939e-02 4.480716e-02 2.094016e+00 3.594678e-03
##  [131] 3.468500e+00 1.109907e+00 1.231738e+00 2.515623e-01 2.655813e-01
##  [136] 1.094964e+00 3.042155e+00 4.533999e+00 1.151631e+00 5.840077e-02
##  [141] 5.068462e-02 5.951247e-01 2.297954e-01 4.756888e-01 8.427032e-01
##  [146] 7.989353e-01 6.604759e+00 4.436879e-01 1.028601e+00 1.083232e+00
##  [151] 1.556869e-02 3.721878e-01 4.004631e+00 2.897739e-01 7.115515e-02
##  [156] 2.397806e-01 5.751372e-02 3.400491e+00 1.029147e+00 4.312149e-01
##  [161] 4.064144e-03 8.564698e-03 3.348461e-01 1.021138e+00 4.398886e-01
##  [166] 1.766573e-03 5.378971e-02 5.325168e-04 5.129123e-01 6.468354e-02
##  [171] 5.520649e-01 1.975011e+00 2.762971e+00 2.802842e+00 5.117078e-02
##  [176] 4.205982e-01 9.508415e-04 4.766235e-01 1.214644e+00 7.117856e+00
##  [181] 1.720373e+00 5.788204e-01 8.930521e-01 1.117535e-01 9.396677e-01
##  [186] 6.844956e-03 4.710264e-01 3.606371e-02 3.862441e-01 1.282289e-02
##  [191] 5.011413e-02 1.797680e-02 7.245496e-02 3.224585e-01 1.447637e+00
##  [196] 3.111981e+00 1.691919e-03 1.217996e+00 4.473727e-01 1.994754e-01
##  [201] 3.010879e-01 1.714753e-01 9.664819e-01 1.045657e-01 1.744888e-02
```

```
## [206] 7.717761e-01 1.248313e+00 2.847336e-01 1.317790e-05 2.458839e-01
## [211] 1.058469e+00 3.526614e+00 8.819654e-04 3.720487e-01 5.087911e-01
## [216] 4.994860e-02 2.274772e+00 1.503935e-02 5.473640e-02 1.287328e+00
## [221] 9.190301e-01 1.485904e+00 5.054900e-01 3.236945e+00 5.635787e-01
## [226] 4.416443e+00 8.166634e-01 9.369833e-02 1.275861e-01 2.282310e+00
## [231] 5.044295e-01 9.529770e-02 2.073421e-01 1.193043e-03 8.774493e-02
## [236] 2.188859e+00 8.904324e+00 1.612837e+00 3.290518e-01 9.029274e-01
## [241] 1.655340e-01 2.430262e-01 3.282745e-01 5.708474e-01 7.212607e-04
## [246] 2.388969e-01 2.781257e-01 1.383564e+00 6.669472e-01 2.836872e-01
## [251] 2.375730e-01 1.103499e+00 1.706676e-01 1.486712e+00 1.501769e+00
## [256] 2.456143e+00 7.250023e-01 2.539766e-02 2.641854e-01 2.760279e+00
## [261] 2.922533e-04 1.442317e+00 9.865118e+00 3.343082e-01 5.465851e+00
## [266] 6.733982e-01 1.786420e-01 4.852499e+00 4.250710e-01 2.736997e-01
## [271] 3.646901e+00 3.445544e-01 2.962343e-04 3.748434e-01 2.998751e+00
## [276] 3.473021e+00 4.697951e-01 1.457521e+00 2.930524e-01 1.834410e-01
## [281] 3.055722e+00 4.908012e-01 8.582183e-01 8.969967e-01 2.503018e-01
## [286] 1.429056e-01 2.362501e-01 4.710105e-01 1.518087e-03 1.125630e+00
## [291] 8.280625e-02 8.914959e-01 4.218114e-02 1.912714e-02 4.050740e-02
## [296] 1.987238e-01 3.086244e-01 4.268880e+00 1.525120e-01 6.442672e-06
## [301] 5.820225e-01 1.288470e-01 5.196874e-01 2.961483e-01 8.031112e-01
## [306] 1.199517e-01 1.099799e+00 2.075253e-01 4.868070e-02 2.001624e+00
## [311] 1.745004e+00 4.193543e-02 2.103015e+00 9.313770e-02 8.693110e-01
## [316] 7.582246e-02 4.307950e-02 4.228610e-03 2.009053e-02 9.194632e-01
## [321] 2.346191e-01 3.549059e-01 2.917683e+00 1.866572e+00 8.132981e-01
## [326] 6.304847e-01 6.859302e-03 3.728045e-01 3.184385e-01 6.623274e-01
## [331] 1.825349e+00 3.390530e-04 3.160030e-01 8.833369e-01 6.008052e-02
## [336] 1.497712e+00 5.061354e-01 5.574305e+00 4.984059e+00 3.098516e-01
## [341] 1.916655e+00 4.183152e-01 3.265714e-01 7.292371e-01 1.079274e+00
## [346] 1.074688e-01 9.000012e-02 1.358674e+00 1.826352e+00 3.782578e+00
## [351] 3.698391e+00 1.520348e-02 1.192648e+00 2.758475e-01 5.667754e-01
## [356] 2.222212e+00 2.136252e+00 3.315672e-01 1.171757e+00 1.825044e-02
## [361] 4.590978e-01 1.130752e+00 3.241625e-01 1.334945e+00 1.350624e+00
## [366] 4.122968e+00 6.254274e-01 1.081871e-01 2.007114e-01 1.090336e-02
## [371] 5.427346e+00 3.899093e-01 3.045531e-01 5.777872e-01 5.260976e-02
## [376] 1.907343e-01 3.394191e-01 3.836279e-02 2.795575e+00 3.448063e-01
## [381] 2.592175e-01 8.412445e-03 6.323672e-01 2.679143e-02 1.394269e-01
## [386] 2.938009e-01 2.150312e-02 8.283529e-03 2.876051e-01 5.429830e-01
## [391] 2.985281e-03 1.492394e-01 5.464555e-01 3.551869e-04 4.909894e-04
## [396] 8.614430e-02 1.091574e+00 5.672509e-02 7.297353e-05 3.646015e-01
## [401] 5.882306e-01 9.240573e-02 5.859369e-04 8.567769e-01 4.588333e+00
## [406] 3.796082e-02 1.999720e-01 2.821227e-01 4.132346e-01 5.385578e-02
## [411] 3.852187e-02 1.331019e+00 1.531210e-02 2.854701e+00 3.286794e-01
## [416] 6.676155e-02 1.231735e+00 2.415614e-01 3.667861e+00 6.966473e-02
## [421] 1.870823e-01 1.707963e+00 3.586449e-01 1.271651e-02 4.227305e+00
## [426] 3.819183e-01 3.066019e+00 9.963651e-02 2.168436e-01 2.733807e-04
## [431] 2.070414e-04 4.456746e-02 9.284914e-01 3.547242e-01 1.335649e-01
## [436] 9.697452e-02 1.731875e+00 1.058257e-01 2.123737e-02 9.622565e-01
## [441] 3.697876e-01 9.505022e-01 6.422543e-01 1.253328e+00 6.936306e-02
## [446] 7.176313e-01 2.032669e-02 2.067985e+00 1.311551e+00 1.849858e+00
## [451] 3.893641e+00 3.296365e+00 4.695779e-02 5.859348e-01 5.168329e-01
## [456] 1.189689e+00 2.210778e-01 4.923096e-02 2.858719e+00 1.511221e-01
## [461] 4.210924e-03 1.184891e+00 2.062634e-02 5.358384e-02 2.473601e-02
## [466] 3.434381e-02 6.388975e-02 2.094808e-02 3.202068e-01 2.941950e-01
## [471] 2.707709e-01 5.644356e-03 2.326811e+00 1.123261e-01 9.712616e-02
```

```
## [476] 2.966232e+00 7.488018e-01 6.152351e-02 7.254144e-02 3.984797e-02
## [481] 7.747086e-01 5.689917e-01 6.133087e-01 3.716257e-01 1.708268e+00
## [486] 2.405244e+00 3.546612e-01 7.009396e-02 3.612459e-01 1.981343e-01
## [491] 5.377803e-01 2.047875e+00 6.177327e-01 1.981781e+00 3.550675e-01
## [496] 1.953135e+00 5.415524e-03 5.405956e-01 4.844719e-02 1.955109e+00
## [501] 2.240658e+00 5.791274e-01 2.088358e-02 2.257493e+00 1.649525e-01
## [506] 1.365102e-01 1.117610e+00 1.109914e+00 2.177052e+00 1.584634e+00
## [511] 6.765553e+00 4.594991e-01 2.166595e-01 6.691645e-01 1.469106e+00
## [516] 2.342354e-01 4.116140e+00 1.210335e+00 8.234328e-01 3.372371e-01
## [521] 6.473837e-02 7.987135e-01 1.399205e-03 4.734380e+00 7.734307e-01
## [526] 1.739813e-01 7.722584e+00 2.937585e+00 1.584201e+00 1.727130e-01
## [531] 2.393165e-02 3.520263e+00 1.279295e+00 9.695140e-03 2.200160e-01
## [536] 1.833638e+00 2.435592e-01 2.120975e+00 7.889823e-01 1.123331e+00
## [541] 1.480841e+00 3.052989e-01 9.477660e-01 2.122826e+00 1.623301e-02
## [546] 5.889645e-01 2.198838e+00 7.597951e-01 1.077542e+00 1.380785e+00
## [551] 2.583793e+00 2.151508e+00
```

```r
dbinom(df$Confirmed, size=1, prob=.25, log = FALSE)
```

```
##   [1] 0.75 0.75 0.75 0.25 0.25 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [16] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [31] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.00 0.00 0.75 0.00 0.00 0.75
##  [46] 0.00 0.00 0.75 0.75 0.25 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
##  [61] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
##  [76] 0.00 0.25 0.00 0.25 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
##  [91] 0.00 0.00 0.75 0.00 0.75 0.75 0.00 0.75 0.75 0.25 0.00 0.00 0.00 0.00 0.00
## [106] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [121] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [136] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [151] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [166] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [181] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [196] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [211] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [226] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [241] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [256] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [271] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [286] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [301] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [316] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [331] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [346] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [361] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [376] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [391] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [406] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [421] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [436] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [451] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [466] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [481] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [496] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [511] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [526] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```
## [541] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```
dbinom(df$Recovered, size=1, prob=.25, log = FALSE)
```

```
##   [1] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [16] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [31] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [46] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.00 0.00 0.00
##  [61] 0.75 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
##  [76] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.25 0.00 0.00 0.00 0.00 0.00 0.00
##  [91] 0.00 0.00 0.00 0.00 0.25 0.00 0.75 0.00 0.00 0.00 0.25 0.00 0.75 0.75 0.25
## [106] 0.00 0.75 0.00 0.75 0.75 0.75 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [121] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [136] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [151] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [166] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [181] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [196] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [211] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [226] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [241] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [256] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [271] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [286] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [301] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [316] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [331] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [346] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [361] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [376] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [391] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [406] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [421] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [436] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [451] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [466] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [481] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [496] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [511] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [526] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [541] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```
dbinom(df$Deceased, size=1, prob=.25, log = FALSE)
```

```
##   [1] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [16] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [31] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [46] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.25 0.75
##  [61] 0.75 0.25 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
##  [76] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.25 0.75 0.75 0.75 0.75
##  [91] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75
## [106] 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.25 0.75 0.25 0.25 0.75 0.75 0.25
## [121] 0.25 0.25 0.25 0.75 0.25 0.75 0.00 0.75 0.25 0.75 0.25 0.75 0.25 0.25 0.25
## [136] 0.75 0.75 0.25 0.75 0.75 0.25 0.75 0.75 0.75 0.75 0.25 0.75 0.75 0.75 0.75
## [151] 0.75 0.25 0.25 0.25 0.75 0.75 0.75 0.75 0.00 0.75 0.75 0.75 0.75 0.00 0.00
```

```
## [166] 0.00 0.25 0.25 0.00 0.25 0.00 0.00 0.25 0.25 0.25 0.00 0.00 0.00 0.00 0.00
## [181] 0.00 0.25 0.00 0.00 0.00 0.25 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [196] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [211] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [226] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [241] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [256] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [271] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [286] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [301] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [316] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [331] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [346] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [361] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [376] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [391] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [406] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [421] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [436] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [451] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [466] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [481] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [496] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [511] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [526] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
## [541] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```r
pbinom(df$Confirmed, size=1, prob=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 1 1 0 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 0 1 0 0 1 1 1 1 1 1 1 1 1 1
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```r
pbinom(df$Recovered, size=1, prob=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 1 0 1 0 0 0
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
pbinom(df$Deceased, size=1, prob=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0
##  [75] 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [112] 0 0 1 0 1 1 0 0 1 1 1 1 0 1 0 1 0 1 0 1 0 1 0 1 1 1 0 0 1 0 0 1 0 0 0 1 0 0
## [149] 0 0 0 1 1 1 0 0 0 0 1 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
qbinom(df$Confirmed, size=1, prob=.25, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qbinom(df$Confirmed, size = 1, prob = 0.25, lower.tail = TRUE, : NaNs
## produced
```

```
##   [1]   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0   1 NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN   1 NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0   1 NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rbinom(df$Confirmed, size=1, prob=0.25)
```

```
##   [1] 0 0 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 1 0 0 1 1 0 0 0 0 1 0 0 0 0 0
##  [38] 1 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 1 1 0 0 0 1 1 0 0 0 0 0 0 0 1
##  [75] 1 1 0 0 1 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
## [112] 1 0 0 0 1 0 1 0 1 1 0 0 1 0 0 0 0 0 0 0 0 1 0 1 0 0 1 0 0 0 0 0 0 1 0 0
## [149] 1 0 1 0 1 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 1 1 1 0 0 1 0 0 1 0 0 0
## [186] 0 0 1 0 1 0 1 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1 0 1 0 1 0 0 1 1 0 0 1 0 0 0
## [223] 0 0 0 0 0 0 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 1 0 0
## [260] 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0
## [297] 0 0 0 0 0 0 1 0 0 0 0 1 0 1 1 1 0 1 1 0 0 1 0 0 0 0 0 0 0 1 0 0 1 0 1 1 0
## [334] 0 0 1 0 0 0 0 0 0 0 0 1 1 0 1 0 0 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0
## [371] 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 1 1 0 1 0 1
## [408] 1 0 0 0 0 1 0 0 0 1 0 1 1 1 1 1 0 0 1 1 0 0 1 0 0 0 0 0 1 0 0 1 1 1 0 0 0
## [445] 0 1 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0 1 1 0 1 0
## [482] 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0
## [519] 0 1 0 1 0 0 0 1 0 0 0 0 0 0 0 1 1 0 0 1 0 1 0 1 0 0 1 0 0 1 1 1 1 0 0 1
```

```r
rbinom(df$Recovered,size = 1,prob = 0.25)
```

```
##   [1] 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 1 1 1 1 0 1 0
##  [38] 1 0 0 0 0 1 0 0 0 0 0 0 1 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
##  [75] 1 1 0 0 1 1 0 0 0 1 0 0 0 1 1 1 0 1 1 0 0 0 0 0 1 0 0 0 1 0 0 1 1 1 1 0 0
## [112] 1 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 1 0 0 0 1 0 1 1 0 1 0 1 0 0
## [149] 1 0 1 0 0 1 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 1 1 0 1 1 0 0 0 0 0 0 0 0 1
## [186] 0 1 0 0 1 0 0 0 1 0 0 1 1 0 0 0 0 0 1 0 0 1 0 0 1 1 0 1 0 0 0 0 0 0 0 0
## [223] 0 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 1
## [260] 0 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 1 0 1 0 0 0 1 0 0 0 0 1 1 0 0 0
## [297] 1 0 0 0 0 0 0 1 0 0 0 1 0 1 0 0 1 0 0 0 0 1 1 0 0 0 0 1 0 0 1 0 0 1 1 0 0
## [334] 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0
## [371] 0 1 1 0 0 1 0 0 0 0 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 0 0 1 0 1 1 1 1 1 0 0 1 0 1
## [408] 1 0 1 0 1 1 0 1 1 0 1 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
## [445] 1 0 0 1 0 0 1 1 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 1 0 0 1 0 1 1
## [482] 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0
## [519] 0 1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0
```

```r
rbinom(df$Deceased,size = 1,prob=0.25)
```

```
##   [1] 0 1 1 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 1 0 0 1
##  [38] 1 0 1 0 0 0 1 1 0 1 0 1 0 1 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 1 1 0 1 0 0
##  [75] 1 0 0 1 0 1 1 1 0 0 0 0 1 0 0 1 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 1 0 0
## [112] 1 0 0 0 0 1 1 1 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 0 1 0 0 0 0 1 0 1 0 1 0
## [149] 1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 1 0 0 1 0 0 1 1 0 0 0 1 1
## [186] 0 0 0 0 1 1 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 1 0 0 0 1 0 0 0 1 0 1 0 0
## [223] 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 1 0 0 1 0 0 0 0 1 1 1 0
## [260] 0 1 0 0 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 0 1 0 0 1 0 1 0 0 0 0
## [297] 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1 1 0 1 1 0 0 1 1 0 0 0 0 0 0 1 0 0 0 0
## [334] 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0 1 0 1 1 0 1 0 0 0 0 0 1 1 0 0 0 0
## [371] 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 1 0 0 0 0 1 0 0 0 1 0 1
```

```
## [408] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0
## [445] 0 1 0 1 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 1 0 0 0 0 0 0
## [482] 0 0 0 0 0 0 0 0 1 1 1 1 0 1 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 0 0 0 1 1 0 1 0
## [519] 0 0 0 1 0 0 0 1 0 0 1 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 1
```

```r
rmultinom(df$Confirmed, size=1, prob=0.25)
```

```
##
## [1,]
```

```r
rmultinom(df$Recovered,size = 1,prob = 0.25)
```

```
##
## [1,]
```

```r
rmultinom(df$Deceased,size = 1,prob=0.25)
```

```
##
## [1,]
```

```r
dgeom(df$Confirmed, prob=.25, log = FALSE)
```

```
##   [1]   2.500000e-01   2.500000e-01   2.500000e-01   1.875000e-01   1.875000e-01
##   [6]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [11]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [16]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [21]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [26]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [31]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [36]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   4.449463e-02
##  [41]   2.502823e-02   2.500000e-01   1.406250e-01   1.054688e-01   2.500000e-01
##  [46]   1.406250e-01   1.054688e-01   2.500000e-01   2.500000e-01   1.875000e-01
##  [51]   7.919088e-03   7.919088e-03   3.340865e-03   7.936982e-05   4.454487e-03
##  [56]   1.877117e-02   1.057071e-03   3.352195e-06   4.449463e-02   7.928030e-04
##  [61]   2.511311e-05   3.337097e-02   2.508478e-04   5.946022e-04   1.877117e-02
##  [66]   1.055878e-02   2.502823e-02   5.939316e-03   2.502823e-02   1.877117e-02
##  [71]   7.919088e-03   3.337097e-02   1.407838e-02   1.406250e-01   1.054688e-01
##  [76]   2.502823e-02   1.875000e-01   3.337097e-02   1.875000e-01   7.910156e-02
##  [81]   1.406250e-01   4.449463e-02   1.057071e-03   1.055878e-02   1.407838e-02
##  [86]   1.054688e-01   3.337097e-02   1.055878e-02   5.939316e-03   7.910156e-02
##  [91]   1.407838e-02   1.406250e-01   2.500000e-01   1.406250e-01   2.500000e-01
##  [96]   2.500000e-01   1.054688e-01   2.500000e-01   2.500000e-01   1.875000e-01
## [101]   1.406250e-01   3.337097e-02   3.337097e-02   5.932617e-02   1.407838e-02
## [106]   1.411019e-04   2.505649e-03   1.055878e-02   4.454487e-03   5.952736e-05
## [111]   7.919088e-03   2.508478e-04   2.508478e-04   1.414207e-06   4.484751e-09
## [116]   5.972924e-08   1.887739e-07   1.064252e-09   2.514146e-06   5.999947e-12
## [121]   4.484751e-09   1.417403e-08   5.979668e-09   1.889870e-08   4.499960e-12
## [126]   1.422210e-11   4.505041e-13   3.386416e-15   8.027059e-15   1.070275e-14
## [131]   1.067862e-12   1.067862e-12   1.892004e-09   1.066657e-11   4.494885e-11
## [136]   5.999947e-12   4.479693e-08   1.422210e-11   3.371164e-11   1.065454e-10
## [141]   1.900564e-13   4.520319e-16   3.394067e-17   6.040711e-18   1.433489e-18
## [146]   6.047532e-19   2.554183e-20   1.072693e-16   4.540770e-20   1.083643e-25
## [151]   4.520319e-16   1.430257e-16   1.073904e-17   3.405578e-20   2.557067e-21
## [156]   1.086092e-27   2.586088e-31   1.935193e-29   1.926477e-25   2.597788e-35
## [161]   6.185578e-39   1.105881e-43   2.651097e-53   2.678160e-62   1.120959e-55
## [166]   1.997318e-57   2.723881e-77   3.640048e-79   1.556583e-91  3.727343e-100
## [171]   2.038305e-75  6.656367e-104  1.572473e-100   2.767258e-91  5.146730e-131
```

```
## [176] 5.175853e-136 6.716733e-112 3.895054e-139 3.799541e-117  4.908479e-89
## [181] 3.930379e-147 3.786700e-114  1.509869e-64 5.348045e-165 2.198398e-142
## [186] 2.210838e-147 1.610184e-121 1.228254e-136 1.247814e-150 1.688340e-163
## [191] 1.257710e-157 9.659041e-179 1.250633e-152 2.954445e-149 2.289551e-178
## [196] 9.379749e-153 9.857254e-197 2.339173e-197 3.136545e-202 1.744508e-192
## [201] 7.561699e-217 5.696932e-221 8.238867e-293 3.299942e-247 4.409865e-249
## [206] 1.074000e-272 1.034738e-239 1.675055e-156 4.660586e-298 1.121058e-310
## [211] 6.242229e-302 4.772378e-319 8.313585e-301 1.905028e-270 1.744508e-192
## [216] 9.284965e-144 1.311337e-194 2.333899e-195 4.729464e-311  0.000000e+00
## [221]  0.000000e+00 3.154293e-207  0.000000e+00  0.000000e+00  0.000000e+00
## [226]  0.000000e+00  0.000000e+00  0.000000e+00 1.131223e-318  0.000000e+00
## [231]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [311]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [316]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [321]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [326]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [331]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [336]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [341]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [346]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [351]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [356]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [361]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [366]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [371]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [376]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [381]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [386]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 1.080077e-277
## [391]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [396]  0.000000e+00 1.847857e-243  0.000000e+00  0.000000e+00  0.000000e+00
## [401]  0.000000e+00  0.000000e+00 1.063147e-263 9.648147e-178 1.096039e-290
## [406] 1.494744e-310 8.009674e-268 1.016223e-223 1.404789e-255 3.219022e-225
## [411] 5.158360e-133 1.856218e-247 1.890038e-263 1.378095e-238 3.307399e-249
## [416] 5.959987e-261 1.373437e-235 3.970501e-156 2.480549e-249 3.535110e-308
## [421] 7.848613e-250 2.425190e-229 4.454883e-258 3.417430e-278 7.376273e-195
## [426] 8.304209e-300  0.000000e+00  0.000000e+00 1.126130e-314 8.484194e-319
## [431]  0.000000e+00 8.266807e-296  0.000000e+00  0.000000e+00  0.000000e+00
## [436]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [441]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```
dgeom(df$Recovered, prob=.25, log = FALSE)
```

```
##   [1]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##   [6]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [11]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [16]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [21]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [26]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [31]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [36]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [41]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [46]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [51]   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01   2.500000e-01
##  [56]   2.500000e-01   2.500000e-01   1.054688e-01   2.502823e-02   7.910156e-02
##  [61]   2.500000e-01   7.910156e-02   1.406250e-01   1.406250e-01   4.454487e-03
##  [66]   2.502823e-02   4.449463e-02   1.054688e-01   7.919088e-03   5.939316e-03
##  [71]   5.939316e-03   1.058264e-04   1.057071e-03   7.945944e-06   1.057071e-03
##  [76]   5.939316e-03   3.337097e-02   1.058264e-04   1.407838e-02   1.406250e-01
##  [81]   5.939316e-03   5.946022e-04   2.505649e-03   1.875000e-01   2.502823e-02
##  [86]   3.340865e-03   3.337097e-02   7.910156e-02   5.939316e-03   7.910156e-02
##  [91]   1.407838e-02   4.454487e-03   1.877117e-02   2.502823e-02   1.875000e-01
##  [96]   5.979668e-09   2.500000e-01   3.337097e-02   5.932617e-02   1.407838e-02
## [101]   1.875000e-01   7.910156e-02   2.500000e-01   2.500000e-01   1.875000e-01
## [106]   1.054688e-01   2.500000e-01   7.910156e-02   2.500000e-01   2.500000e-01
## [111]   2.500000e-01   5.932617e-02   2.502823e-02   1.406250e-01   1.054688e-01
## [116]   5.932617e-02   7.919088e-03   1.407838e-02   1.407838e-02   1.054688e-01
## [121]   1.407838e-02   1.407838e-02   3.340865e-03   1.409428e-03   1.057071e-03
## [126]   2.508478e-04   3.352195e-06   4.459517e-04   1.415804e-07   1.885610e-06
## [131]   1.055878e-02   1.412612e-05   1.889870e-08   4.484751e-09   2.511311e-05
## [136]   4.474640e-07   2.519827e-08   1.894141e-10   7.972891e-09   1.423815e-12
## [141]   1.898421e-12   2.534086e-13   1.889870e-08   6.006722e-13   2.531228e-12
## [146]   7.972891e-09   1.896279e-11   5.972924e-08   1.892004e-09   4.510128e-14
```

```
## [151]  1.414207e-06  3.371164e-11  1.065454e-10  8.054281e-18  1.446489e-26
## [156]  1.928652e-26  1.930830e-27  4.525423e-17  3.413273e-22  1.904859e-15
## [161]  1.902710e-14  6.054360e-20  2.539812e-15  3.401737e-19  8.054281e-18
## [166]  1.438350e-21  6.081752e-24  8.127325e-26  8.164095e-30  6.040711e-18
## [171]  8.136502e-27  8.099856e-23  6.136907e-32  1.461256e-35  2.597788e-35
## [176]  2.657087e-55 2.865781e-122 2.173729e-132  2.066096e-87  2.082482e-94
## [181]  3.668917e-86  6.493142e-82 4.969791e-100 2.824045e-109  2.779778e-95
## [186]  2.754795e-87 3.739983e-103 6.846836e-129 1.673166e-155 2.798664e-101
## [191] 4.986645e-103 1.342786e-215 1.612002e-122  2.792354e-99 1.719102e-179
## [196] 2.830426e-111  4.952994e-97 3.004882e-164 1.180686e-101 1.231030e-138
## [201] 1.236599e-142 7.187280e-172 2.225859e-153 2.225859e-153 1.287872e-178
## [206] 9.486201e-163 5.199270e-140 5.294002e-156 3.070008e-183 4.033730e-170
## [211] 1.411144e-259 2.520051e-263 2.565967e-279 5.703365e-222 7.527642e-213
## [216] 4.490214e-265 2.531452e-267 5.853338e-245  0.000000e+00 4.490214e-265
## [221] 1.077642e-275 6.102919e-282 5.781126e-234 1.879404e-258 2.368391e-208
## [226] 5.360129e-167 3.288789e-244 4.330954e-233 5.986952e-265 1.129949e-317
## [231] 4.587532e-284  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [311]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [316]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [321]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [326]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [331]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [336]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [341]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [346]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [351]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [356]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [361]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [366]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [371]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [376]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [381]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [386]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [391]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [396]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [401]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [406]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [411]  0.000000e+00  0.000000e+00  0.000000e+00 4.495284e-266 7.822086e-247
## [416] 1.440102e-277 1.448251e-282 5.703365e-222 1.074000e-272 1.057165e-258
```

```
## [421] 2.438913e-234 7.769301e-241 1.060750e-261 7.699474e-233 2.449947e-238
## [426] 1.849944e-244 4.444839e-256 1.365710e-230 4.603089e-287 9.991651e-209
## [431] 8.054997e-273 1.829184e-234 1.837460e-238 1.389025e-245 8.091439e-277
## [436] 1.494744e-310 4.940656e-324 6.200106e-296 1.992992e-310 0.000000e+00
## [441]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [446]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [451]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [456]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [461]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [466]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [471]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [476]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [481]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [486]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [491]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [496]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [501]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [506]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [511]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [516]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [521]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [526]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [531]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [536]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [541]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [546]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [551]  0.000000e+00  0.000000e+00
```

```r
dgeom(df$Deceased, prob=.25, log = FALSE)
```

```
##   [1] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##   [6] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [11] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [16] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [21] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [26] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [31] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [36] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [41] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [46] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [51] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [56] 2.500000e-01 2.500000e-01 2.500000e-01 1.875000e-01 2.500000e-01
##  [61] 2.500000e-01 1.875000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [66] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [71] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [76] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [81] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [86] 1.875000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [91] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
##  [96] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
## [101] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
## [106] 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
## [111] 2.500000e-01 2.500000e-01 2.500000e-01 1.875000e-01 2.500000e-01
## [116] 1.875000e-01 1.875000e-01 2.500000e-01 2.500000e-01 1.875000e-01
## [121] 1.875000e-01 1.875000e-01 1.875000e-01 2.500000e-01 1.875000e-01
```

```
## [126] 2.500000e-01 1.054688e-01 2.500000e-01 1.875000e-01 2.500000e-01
## [131] 1.875000e-01 2.500000e-01 1.875000e-01 1.875000e-01 1.875000e-01
## [136] 2.500000e-01 2.500000e-01 1.875000e-01 2.500000e-01 2.500000e-01
## [141] 1.875000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
## [146] 1.875000e-01 2.500000e-01 2.500000e-01 2.500000e-01 2.500000e-01
## [151] 2.500000e-01 1.875000e-01 1.875000e-01 1.875000e-01 2.500000e-01
## [156] 2.500000e-01 2.500000e-01 2.500000e-01 1.406250e-01 2.500000e-01
## [161] 2.500000e-01 2.500000e-01 2.500000e-01 1.406250e-01 1.406250e-01
## [166] 1.406250e-01 1.875000e-01 1.875000e-01 1.406250e-01 1.875000e-01
## [171] 1.406250e-01 1.406250e-01 1.875000e-01 1.875000e-01 1.875000e-01
## [176] 5.932617e-02 7.910156e-02 5.932617e-02 1.406250e-01 1.406250e-01
## [181] 7.910156e-02 1.875000e-01 1.406250e-01 1.054688e-01 2.502823e-02
## [186] 1.875000e-01 1.406250e-01 1.054688e-01 3.337097e-02 1.054688e-01
## [191] 5.932617e-02 7.910156e-02 1.406250e-01 3.337097e-02 5.932617e-02
## [196] 4.449463e-02 1.054688e-01 1.407838e-02 3.337097e-02 1.407838e-02
## [201] 5.939316e-03 4.449463e-02 3.337097e-02 1.877117e-02 7.919088e-03
## [206] 3.340865e-03 5.932617e-02 1.055878e-02 1.407838e-02 5.939316e-03
## [211] 1.407838e-02 3.337097e-02 4.449463e-02 3.337097e-02 3.337097e-02
## [216] 7.910156e-02 3.337097e-02 1.407838e-02 1.055878e-02 1.055878e-02
## [221] 1.407838e-02 7.919088e-03 5.939316e-03 7.919088e-03 7.919088e-03
## [226] 4.454487e-03 3.340865e-03 4.454487e-03 3.340865e-03 7.919088e-03
## [231] 4.454487e-03 1.877117e-02 7.919088e-03 1.409428e-03 2.505649e-03
## [236] 1.409428e-03 1.057071e-03 7.928030e-04 5.946022e-04 4.459517e-04
## [241] 5.946022e-04 5.946022e-04 7.928030e-04 4.459517e-04 3.344638e-04
## [246] 5.952736e-05 7.928030e-04 4.459517e-04 3.344638e-04 3.344638e-04
## [251] 1.881359e-04 4.459517e-04 2.508478e-04 1.881359e-04 3.344638e-04
## [256] 1.881359e-04 4.459517e-04 5.946022e-04 7.928030e-04 3.344638e-04
## [261] 2.508478e-04 1.411019e-04 4.459517e-04 5.946022e-04 2.508478e-04
## [266] 1.411019e-04 3.344638e-04 1.411019e-04 1.881359e-04 1.411019e-04
## [271] 7.928030e-04 2.508478e-04 1.058264e-04 1.411019e-04 7.936982e-05
## [276] 1.058264e-04 7.936982e-05 5.946022e-04 1.411019e-04 7.936982e-05
## [281] 1.411019e-04 1.058264e-04 7.936982e-05 2.508478e-04 4.459517e-04
## [286] 7.936982e-05 5.952736e-05 1.881359e-04 1.411019e-04 1.411019e-04
## [291] 5.946022e-04 1.057071e-03 1.058264e-04 7.936982e-05 1.411019e-04
## [296] 7.936982e-05 1.881359e-04 1.058264e-04 4.459517e-04 2.508478e-04
## [301] 1.411019e-04 1.058264e-04 3.344638e-04 1.881359e-04 1.058264e-04
## [306] 5.946022e-04 1.411019e-04 7.936982e-05 3.348414e-05 5.952736e-05
## [311] 2.511311e-05 7.936982e-05 3.344638e-04 3.348414e-05 1.059459e-05
## [316] 1.411019e-04 5.952736e-05 2.511311e-05 5.952736e-05 2.508478e-04
## [321] 1.883483e-05 1.058264e-04 1.058264e-04 3.344638e-04 5.952736e-05
## [326] 4.464552e-05 1.058264e-04 1.058264e-04 4.459517e-04 4.459517e-04
## [331] 2.505649e-03 5.946022e-04 1.881359e-04 4.454487e-03 2.508478e-04
## [336] 7.936982e-05 4.464552e-05 3.344638e-04 5.946022e-04 1.881359e-04
## [341] 1.057071e-03 2.508478e-04 1.881359e-04 1.881359e-04 3.344638e-04
## [346] 4.459517e-04 3.344638e-04 7.928030e-04 1.881359e-04 1.411019e-04
## [351] 1.057071e-03 3.344638e-04 1.058264e-04 5.946022e-04 1.879237e-03
## [356] 1.411019e-04 1.409428e-03 5.946022e-04 1.057071e-03 3.344638e-04
## [361] 7.928030e-04 1.879237e-03 1.057071e-03 7.928030e-04 1.057071e-03
## [366] 4.459517e-04 1.409428e-03 5.946022e-04 1.879237e-03 2.505649e-03
## [371] 7.928030e-04 1.879237e-03 1.057071e-03 2.505649e-03 1.057071e-03
## [376] 2.505649e-03 1.057071e-03 1.409428e-03 2.505649e-03 1.409428e-03
## [381] 2.505649e-03 3.340865e-03 5.939316e-03 1.409428e-03 2.505649e-03
## [386] 4.454487e-03 3.340865e-03 5.939316e-03 3.340865e-03 2.505649e-03
## [391] 4.454487e-03 1.879237e-03 4.454487e-03 4.454487e-03 1.409428e-03
```

```
## [396] 3.340865e-03 5.939316e-03 2.505649e-03 3.340865e-03 4.454487e-03
## [401] 2.505649e-03 2.505649e-03 5.939316e-03 7.919088e-03 2.505649e-03
## [406] 4.454487e-03 5.939316e-03 4.454487e-03 7.919088e-03 3.340865e-03
## [411] 1.055878e-02 3.340865e-03 5.939316e-03 3.340865e-03 1.879237e-03
## [416] 3.340865e-03 5.939316e-03 7.919088e-03 1.407838e-02 1.407838e-02
## [421] 7.919088e-03 4.454487e-03 4.454487e-03 7.919088e-03 1.055878e-02
## [426] 2.505649e-03 3.340865e-03 1.055878e-02 4.454487e-03 7.919088e-03
## [431] 1.407838e-02 7.919088e-03 4.454487e-03 2.505649e-03 1.409428e-03
## [436] 4.459517e-04 1.879237e-03 2.505649e-03 1.055878e-02 7.928030e-04
## [441] 4.459517e-04 7.928030e-04 5.946022e-04 1.058264e-04 1.881359e-04
## [446] 5.946022e-04 7.936982e-05 4.459517e-04 7.936982e-05 1.058264e-04
## [451] 1.881359e-04 4.464552e-05 7.936982e-05 2.511311e-05 1.885610e-06
## [456] 2.516985e-07 1.887739e-07 2.516985e-07 1.887739e-07 5.966187e-07
## [461] 1.889870e-08 1.417403e-08 3.363563e-09 4.479693e-08 2.522672e-09
## [466] 7.981893e-10 1.892004e-09 3.371164e-11 3.378781e-13 1.900564e-13
## [471] 6.006722e-13 2.534086e-13 1.898421e-12 3.374970e-12 1.900564e-13
## [476] 2.539812e-15 2.545551e-17 4.535649e-19 2.562845e-23 8.118159e-25
## [481] 8.127325e-26 1.922134e-23 3.405578e-20 6.081752e-24 1.444858e-25
## [486] 4.571620e-26 1.443228e-24 4.556169e-23 1.444858e-25 6.109267e-28
## [491] 1.915637e-20 3.397900e-18 1.930830e-27 1.088546e-29 1.086092e-27
## [496] 8.045197e-17 8.081595e-21 1.444858e-25 6.074892e-23 1.079981e-22
## [501] 4.576782e-27 1.917800e-21 4.551030e-22 1.076331e-19 2.531228e-12
## [506] 1.423815e-12 1.071483e-15 2.539812e-15 4.505041e-13 6.047532e-19
## [511] 4.540770e-20 2.548425e-18 4.520319e-16 4.520319e-16 4.484751e-09
## [516] 4.515221e-15 2.536947e-14 4.535649e-19 8.045197e-17 1.435108e-19
## [521] 3.397900e-18 7.990906e-11 4.510128e-14 4.535649e-19 8.072480e-20
## [526] 4.535649e-19 1.431872e-17 6.020294e-15 1.900564e-13 8.018005e-14
## [531] 8.045197e-17 2.545551e-17 3.374970e-12 1.431872e-17 1.428644e-15
## [536] 1.896279e-11 1.417403e-08 2.536947e-14 1.902710e-14 1.430257e-16
## [541] 8.054281e-18 1.425423e-13 1.419003e-09 3.397900e-18 8.081595e-21
## [546] 1.073904e-17 2.545551e-17 8.036123e-16 2.528373e-11 2.519827e-08
## [551] 4.520319e-16 8.072480e-20
```

```r
pgeom(df$Confirmed, prob=.25, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.2500000 0.2500000 0.2500000 0.4375000 0.4375000 0.2500000 0.2500000
##   [8] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [15] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [22] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [29] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [36] 0.2500000 0.2500000 0.2500000 0.2500000 0.8665161 0.9249153 0.2500000
##  [43] 0.5781250 0.6835938 0.2500000 0.5781250 0.6835938 0.2500000 0.2500000
##  [50] 0.4375000 0.9762427 0.9762427 0.9899774 0.9997619 0.9866365 0.9436865
##  [57] 0.9968288 0.9999899 0.8665161 0.9976216 0.9999247 0.8998871 0.9992475
##  [64] 0.9982162 0.9436865 0.9683236 0.9249153 0.9821821 0.9249153 0.9436865
##  [71] 0.9762427 0.8998871 0.9577649 0.5781250 0.6835938 0.9249153 0.4375000
##  [78] 0.8998871 0.4375000 0.7626953 0.5781250 0.8665161 0.9968288 0.9683236
##  [85] 0.9577649 0.6835938 0.8998871 0.9683236 0.9821821 0.7626953 0.9577649
##  [92] 0.5781250 0.2500000 0.5781250 0.2500000 0.2500000 0.6835938 0.2500000
##  [99] 0.2500000 0.4375000 0.5781250 0.8998871 0.8998871 0.8220215 0.9577649
## [106] 0.9995767 0.9924831 0.9683236 0.9866365 0.9998214 0.9762427 0.9992475
## [113] 0.9992475 0.9999958 1.0000000 0.9999998 0.9999994 1.0000000 0.9999925
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000 1.0000000
```

```
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pgeom(df$Recovered, prob=.25, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##    [8] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [15] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [22] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [29] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [36] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [43] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [50] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [57] 0.2500000 0.6835938 0.9249153 0.7626953 0.2500000 0.7626953 0.5781250
##   [64] 0.5781250 0.9866365 0.9249153 0.8665161 0.6835938 0.9762427 0.9821821
##   [71] 0.9821821 0.9996825 0.9968288 0.9999762 0.9968288 0.9821821 0.8998871
##   [78] 0.9996825 0.9577649 0.5781250 0.9821821 0.9982162 0.9924831 0.4375000
##   [85] 0.9249153 0.9899774 0.8998871 0.7626953 0.9821821 0.7626953 0.9577649
##   [92] 0.9866365 0.9436865 0.9249153 0.4375000 1.0000000 0.2500000 0.8998871
##   [99] 0.8220215 0.9577649 0.4375000 0.7626953 0.2500000 0.2500000 0.4375000
##  [106] 0.6835938 0.2500000 0.7626953 0.2500000 0.2500000 0.2500000 0.8220215
##  [113] 0.9249153 0.5781250 0.6835938 0.8220215 0.9762427 0.9577649 0.9577649
##  [120] 0.6835938 0.9577649 0.9577649 0.9899774 0.9957717 0.9968288 0.9992475
##  [127] 0.9999899 0.9986621 0.9999996 0.9999943 0.9683236 0.9999576 0.9999999
##  [134] 1.0000000 0.9999247 0.9999987 0.9999999 1.0000000 1.0000000 1.0000000
##  [141] 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000 1.0000000 1.0000000
##  [148] 0.9999998 1.0000000 1.0000000 0.9999958 1.0000000 1.0000000 1.0000000
##  [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
##  [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
pgeom(df$Deceased, prob=.25, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##   [8] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [15] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [22] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [29] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [36] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [43] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [50] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [57] 0.2500000 0.2500000 0.4375000 0.2500000 0.2500000 0.4375000 0.2500000
##  [64] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [71] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [78] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [85] 0.2500000 0.4375000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [92] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
##  [99] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
## [106] 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
## [113] 0.2500000 0.4375000 0.2500000 0.4375000 0.4375000 0.2500000 0.2500000
## [120] 0.4375000 0.4375000 0.4375000 0.4375000 0.2500000 0.4375000 0.2500000
## [127] 0.6835938 0.2500000 0.4375000 0.2500000 0.4375000 0.2500000 0.4375000
## [134] 0.4375000 0.4375000 0.2500000 0.2500000 0.4375000 0.2500000 0.2500000
```

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```
## [141] 0.4375000 0.2500000 0.2500000 0.2500000 0.2500000 0.4375000 0.2500000
## [148] 0.2500000 0.2500000 0.2500000 0.2500000 0.4375000 0.4375000 0.4375000
## [155] 0.2500000 0.2500000 0.2500000 0.2500000 0.5781250 0.2500000 0.2500000
## [162] 0.2500000 0.2500000 0.5781250 0.5781250 0.5781250 0.4375000 0.4375000
## [169] 0.5781250 0.4375000 0.5781250 0.5781250 0.4375000 0.4375000 0.4375000
## [176] 0.8220215 0.7626953 0.8220215 0.5781250 0.5781250 0.7626953 0.4375000
## [183] 0.5781250 0.6835938 0.9249153 0.4375000 0.5781250 0.6835938 0.8998871
## [190] 0.6835938 0.8220215 0.7626953 0.5781250 0.8998871 0.8220215 0.8665161
## [197] 0.6835938 0.9577649 0.8998871 0.9577649 0.9821821 0.8665161 0.8998871
## [204] 0.9436865 0.9762427 0.9899774 0.8220215 0.9683236 0.9577649 0.9821821
## [211] 0.9577649 0.8998871 0.8665161 0.8998871 0.8998871 0.7626953 0.8998871
## [218] 0.9577649 0.9683236 0.9683236 0.9577649 0.9762427 0.9821821 0.9762427
## [225] 0.9762427 0.9866365 0.9899774 0.9866365 0.9899774 0.9762427 0.9866365
## [232] 0.9436865 0.9762427 0.9957717 0.9924831 0.9957717 0.9968288 0.9976216
## [239] 0.9982162 0.9986621 0.9982162 0.9982162 0.9976216 0.9986621 0.9989966
## [246] 0.9998214 0.9976216 0.9986621 0.9989966 0.9989966 0.9994356 0.9986621
## [253] 0.9992475 0.9994356 0.9989966 0.9994356 0.9986621 0.9982162 0.9976216
## [260] 0.9989966 0.9992475 0.9995767 0.9986621 0.9982162 0.9992475 0.9995767
## [267] 0.9989966 0.9995767 0.9994356 0.9995767 0.9976216 0.9992475 0.9996825
## [274] 0.9995767 0.9997619 0.9996825 0.9997619 0.9982162 0.9995767 0.9997619
## [281] 0.9995767 0.9996825 0.9997619 0.9992475 0.9986621 0.9997619 0.9998214
## [288] 0.9994356 0.9995767 0.9995767 0.9982162 0.9968288 0.9996825 0.9997619
## [295] 0.9995767 0.9997619 0.9994356 0.9996825 0.9986621 0.9992475 0.9995767
## [302] 0.9996825 0.9989966 0.9994356 0.9996825 0.9982162 0.9995767 0.9997619
## [309] 0.9998995 0.9998214 0.9999247 0.9997619 0.9989966 0.9998995 0.9999682
## [316] 0.9995767 0.9998214 0.9999247 0.9998214 0.9992475 0.9999435 0.9996825
## [323] 0.9996825 0.9989966 0.9998214 0.9998661 0.9996825 0.9996825 0.9986621
## [330] 0.9986621 0.9924831 0.9982162 0.9994356 0.9866365 0.9992475 0.9997619
## [337] 0.9998661 0.9989966 0.9982162 0.9994356 0.9968288 0.9992475 0.9994356
## [344] 0.9994356 0.9989966 0.9986621 0.9989966 0.9976216 0.9994356 0.9995767
## [351] 0.9968288 0.9989966 0.9996825 0.9982162 0.9943623 0.9995767 0.9957717
## [358] 0.9982162 0.9968288 0.9989966 0.9976216 0.9943623 0.9968288 0.9976216
## [365] 0.9968288 0.9986621 0.9957717 0.9982162 0.9943623 0.9924831 0.9976216
## [372] 0.9943623 0.9968288 0.9924831 0.9968288 0.9924831 0.9968288 0.9957717
## [379] 0.9924831 0.9957717 0.9924831 0.9899774 0.9821821 0.9957717 0.9924831
## [386] 0.9866365 0.9899774 0.9821821 0.9899774 0.9924831 0.9866365 0.9943623
## [393] 0.9866365 0.9866365 0.9957717 0.9899774 0.9821821 0.9924831 0.9899774
## [400] 0.9866365 0.9924831 0.9924831 0.9821821 0.9762427 0.9924831 0.9866365
## [407] 0.9821821 0.9866365 0.9762427 0.9899774 0.9683236 0.9899774 0.9821821
## [414] 0.9899774 0.9943623 0.9899774 0.9821821 0.9762427 0.9577649 0.9577649
## [421] 0.9762427 0.9866365 0.9866365 0.9762427 0.9683236 0.9924831 0.9899774
## [428] 0.9683236 0.9866365 0.9762427 0.9577649 0.9762427 0.9866365 0.9924831
## [435] 0.9957717 0.9986621 0.9943623 0.9924831 0.9683236 0.9976216 0.9986621
## [442] 0.9976216 0.9982162 0.9996825 0.9994356 0.9982162 0.9997619 0.9986621
## [449] 0.9997619 0.9996825 0.9994356 0.9998661 0.9997619 0.9999247 0.9999943
## [456] 0.9999992 0.9999994 0.9999992 0.9999994 0.9999982 0.9999999 1.0000000
## [463] 1.0000000 0.9999999 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000
```

```
qgeom(df$Confirmed, prob=.25, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qgeom(df$Confirmed, prob = 0.25, lower.tail = TRUE, log.p = FALSE):
## NaNs produced
```

```
##   [1]   0   0   0 Inf Inf   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0 Inf NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN Inf NaN Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0 Inf NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN   0 NaN NaN   0 NaN NaN   0 NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
rgeom(df$Confirmed, prob=.5)
```

```
##   [1]  1  0  0  0  9  1  1  3  1  0  2  0  0  1  4  2  0  1  0  0  0  0  0  3
##  [26]  2  1  0  1  0  1  0  1  0  0  0  0  0  0  0  0  1  0  0  1  0  1  0  2  0
##  [51]  0  1  0  1  1  0  3  0  5  0  2  0  0  0  0  0  2  0  1  7  0  0  2  1  1
##  [76]  1  3  0  2  3  2  0  1  0  0  2  0  0  1  0  2  1  2  3  6  0  5  0  1  2
## [101]  0  1  1  1  0  0  6  0  3  0  2  1  2  1  2  4  1  0  1  0  0  1  0  5  1
## [126]  1  2  0  0  0  0  0  0  1  0  0  0  0  6  0  1  2  0  2  0  2  2  0  0  0
## [151]  1  0  0  0  0  0  0  1  0  1  2  0  0  0  0  0  2  1  0  1  0  1  1  0  2
## [176]  1  2  1  0  0  9  0  1  0  0  0  2  1  0  0  3  1  0  0  0  0  8  0  0  0
## [201]  2  2  0  2  1  0  0  0  2  3  0  3  3  1  2  3  2  3  0  0 10  1  1  0  2
## [226]  2  6  0  0  0  1  5  0  0  2  3  1  1  1  0  1  0  1  0  0  2  1  0  0  6
## [251]  2  4  1  6  0  0  0  0  0  0  0  1  4  0  1  0  1  1  0  1  4  1  3  0  1
```

```
## [276]   0   0   2   1   0   2   2   2   0   1   0   0   0   1   1   0   0   1   0   2   0   2   0   3   0
## [301]   0   2   0   0   2   2   4   7   0   0   0   0   0   0   1   0   0   0   0   3   3   0   0   2   1
## [326]   0   0   0   1   0   0   0   0   1   0   1   0   0   0   0   0   0   1   0   1   3   0   1   0   0
## [351]   1   0   2   0   3   1   3   0   2   0   0   1   3   0   0   1   3   0   0   1   0   0   0   1   0
## [376]   0   2   0   0   0   3   2   1   0   0   0   2   1   0   1   0   0   1   0   0   0   0   0   2   1
## [401]   0   0   0   0   0   0   2   1   1   0   2   1   6   3   0   0   0   0   0   4   0   0   0   0   0
## [426]   2   0   3   1   0   0   2   2   0   3   0   3   2   0   1   0   1   0   0   3   0   0   3   4   1
## [451]   0   0   0   0   0   1   3   0   1   4   1   0   4   0   0   3   0   0   0   0   0   0   5   2   5
## [476]   0   0   1   1   3   0   1   1   0   3   2   3   0   0   1   1   4   2   1   0   0   1   1   0   0
## [501]   7   1   0   0   0   0   0   0   1   7   4   1   1   0   2   1   4   2   1   1   0   1   1   0   0
## [526]   0   2   0   0   0   0   0   1   0   1   0   0   0   0   4   2   0   6   0   2   0   0   0   1   0
## [551]   0   0
```

```r
rgeom(df$Recovered,prob = .5)
```

```
##   [1] 1 1 0 0 2 0 0 3 0 1 1 1 0 0 2 0 2 1 3 0 0 0 0 1 0 0 0 0 1 1 1 4 0 1 1 0 0
##  [38] 1 1 8 3 2 0 0 2 2 1 0 0 0 1 0 4 0 0 0 0 2 0 2 6 2 1 1 0 1 0 1 0 0 1 3 0 0
##  [75] 3 0 0 0 0 0 0 0 1 1 1 0 2 0 2 1 0 2 0 0 2 1 2 0 0 1 0 0 2 2 1 0 0 2 0 1 4
## [112] 2 3 0 1 2 0 0 0 3 0 0 0 0 0 0 3 3 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 1 5 0 0 0
## [149] 4 2 2 0 0 0 0 2 1 0 0 3 2 9 0 0 0 0 0 1 1 0 2 3 4 0 2 0 1 0 1 2 2 1 0 0 1
## [186] 0 0 0 0 3 0 0 2 1 0 0 1 1 0 1 0 0 3 0 0 0 0 1 0 0 1 0 1 1 2 1 3 0 1 0 1 2
## [223] 1 2 0 2 1 3 0 0 0 0 0 3 2 0 0 1 2 0 0 1 0 0 2 2 0 1 2 3 0 0 3 1 3 3 0 4 2
## [260] 1 0 0 1 0 0 0 0 0 1 1 0 2 1 2 0 1 6 2 0 0 0 0 3 4 1 5 1 1 1 0 1 1 0 0 0 1
## [297] 0 0 0 0 0 2 2 0 0 0 0 0 6 1 1 0 1 2 1 0 1 4 3 0 1 1 0 0 2 1 2 6 0 0 0 0 1
## [334] 3 0 2 0 2 0 0 0 1 0 0 0 0 1 0 0 0 0 1 1 1 4 4 0 0 0 1 0 1 0 0 0 2 0 1 0 0
## [371] 0 1 1 0 0 0 0 6 0 2 1 0 0 3 1 0 2 2 0 0 2 0 0 0 0 0 0 0 6 1 1 0 1 0 5 4 3 0
## [408] 0 6 0 0 0 2 0 0 0 2 1 0 0 1 0 0 2 0 1 0 2 0 0 1 0 0 0 3 0 0 0 1 0 3 0 0 0
## [445] 3 0 1 0 0 1 0 0 1 2 3 0 0 1 0 1 3 0 2 0 0 0 1 0 1 1 0 1 2 0 0 0 0 0 0 0 2
## [482] 0 0 4 0 0 1 2 0 0 0 0 0 0 0 3 3 0 0 2 1 1 2 0 0 0 0 0 4 1 0 0 0 0 1 1 0 3
## [519] 1 0 0 2 0 4 0 0 0 0 0 1 1 1 1 0 1 2 1 0 0 1 0 0 4 0 2 4 1 0 2 1 3 0
```

```r
rgeom(df$Deceased,prob = .5)
```

```
##   [1] 0 0 0 0 0 2 0 0 3 8 0 0 0 1 0 0 4 0 0 2 0 0 0 0 0 0 0 1 0 3 8 0 0 0 1 0 5 0
##  [38] 0 1 0 0 0 0 2 4 3 0 0 0 0 2 0 1 0 0 1 0 3 0 0 5 0 0 1 0 1 2 0 0 1 0 2 3 1
##  [75] 0 1 0 2 0 1 0 3 5 1 0 0 1 1 0 0 0 3 1 0 1 1 1 5 0 0 1 0 0 1 1 0 0 0 5 0 3
## [112] 0 1 0 1 4 2 2 2 0 1 0 1 3 0 1 0 0 0 1 1 0 1 0 0 1 1 2 1 5 1 2 0 0 0 0 0 1
## [149] 0 0 6 5 0 0 3 2 0 0 0 2 0 2 0 2 3 2 2 0 3 4 2 1 0 0 2 0 0 2 1 2 0 1 0 2 0
## [186] 0 1 0 1 7 1 4 0 1 1 0 1 0 1 0 0 4 0 0 0 0 0 1 0 3 0 0 0 0 1 1 6 0 1 1 2 0
## [223] 0 0 0 2 0 2 1 3 0 1 0 2 0 3 2 0 1 0 2 1 0 0 0 0 0 0 3 0 2 0 0 0 2 1 1 0 0
## [260] 0 3 0 1 1 0 0 0 1 1 0 0 1 3 1 1 1 0 2 0 2 1 0 0 1 1 1 1 6 0 1 0 3 0 2 0 2
## [297] 1 0 1 2 1 1 1 1 1 0 0 0 0 4 0 0 0 1 0 0 1 2 0 0 1 5 1 0 0 0 0 0 2 0 2 4
## [334] 4 1 0 1 3 1 0 0 0 1 0 4 2 3 0 0 1 0 5 3 0 0 3 0 0 0 0 1 0 1 4 0 1 1 1 4 1
## [371] 0 0 0 0 4 1 0 1 4 1 1 3 1 6 1 1 0 0 1 0 1 1 4 1 0 0 0 0 0 0 0 4 2 0 1 2 1
## [408] 0 2 0 0 0 0 1 0 1 2 2 2 0 0 2 0 1 0 0 0 0 1 0 0 4 2 0 0 1 1 0 2 0 0 0 0 0
## [445] 2 1 1 0 0 1 0 0 0 2 0 3 6 0 2 1 2 3 0 0 0 4 2 0 0 1 0 0 0 0 0 1 1 0 1 2 1
## [482] 3 0 0 1 0 4 0 1 1 4 3 0 0 1 0 2 0 0 0 0 2 0 2 0 3 0 0 4 1 0 2 1 1 2 2 0 1
## [519] 2 0 2 2 3 0 2 0 0 0 0 2 1 1 0 0 0 1 0 0 0 2 0 0 1 1 0 4 2 5 0 3 0 1
```

```r
dhyper(df$Confirmed, m=1, n=1, k=1, log = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.0 0.0 0.5 0.0 0.0 0.5 0.0 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0
##  [55] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [73] 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```
##   [91] 0.0 0.0 0.5 0.0 0.5 0.5 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [109] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [127] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [145] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [163] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [181] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
dhyper(df$Recovered, m=1, n=1, k=1, log = FALSE)
```

```
##    [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [55] 0.5 0.5 0.5 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##   [73] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##   [91] 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.0 0.0 0.0 0.5 0.0 0.5 0.5 0.5 0.0 0.5 0.0
## [109] 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [127] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [145] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [163] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [181] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```
## [469]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
dhyper(df$Deceased, m=1, n=1, k=1, log = FALSE)
```

```
##   [1]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [73]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [91]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [109]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [127]  0.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [145]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.0 0.5 0.5 0.5
## [163]  0.5 0.0 0.0 0.0 0.5 0.5 0.0 0.5 0.0 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0
## [181]  0.0 0.5 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [325]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541]  0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
phyper(df$Confirmed, m=1, n=1, k=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1]  0.5 0.5 0.5 1.0 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19]  0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37]  0.5 0.5 0.5 1.0 1.0 0.5 1.0 1.0 0.5 1.0 1.0 0.5 0.5 1.0 1.0 1.0 1.0 1.0
##  [55]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [73]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [91]  1.0 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [109]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [127]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [145]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [163]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [181]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [199]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [217]  1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
phyper(df$Recovered, m=1, n=1, k=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55] 0.5 0.5 0.5 1.0 1.0 1.0 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [73] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [91] 1.0 1.0 1.0 1.0 1.0 1.0 0.5 1.0 1.0 1.0 1.0 1.0 0.5 0.5 1.0 1.0 0.5 1.0
## [109] 0.5 0.5 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [127] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [145] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [163] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
phyper(df$Deceased, m=1, n=1, k=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55] 0.5 0.5 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [73] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 1.0 0.5 0.5 0.5 0.5
##  [91] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [109] 0.5 0.5 0.5 0.5 0.5 1.0 0.5 1.0 1.0 0.5 0.5 1.0 1.0 1.0 1.0 0.5 1.0 0.5
## [127] 1.0 0.5 1.0 0.5 1.0 0.5 1.0 1.0 1.0 0.5 0.5 1.0 1.0 0.5 1.0 0.5 0.5 0.5
## [145] 0.5 1.0 0.5 0.5 0.5 0.5 0.5 1.0 1.0 1.0 0.5 0.5 0.5 0.5 1.0 0.5 0.5 0.5
## [163] 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
qhyper(df$Confirmed, m=1, n=1, k=1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qhyper(df$Confirmed, m = 1, n = 1, k = 1, lower.tail = TRUE, : NaNs
## produced
```

```
##   [1]   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0   1 NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN   1 NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0   1 NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rhyper(df$Confirmed, m=1, n=1, k=1)
```

```
##   [1] 0 0 1 1 0 1 1 0 1 1 1 0 0 0 0 1 0 0 1 0 1 0 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1
##  [38] 0 1 1 0 1 1 0 0 0 0 0 1 1 1 0 1 0 0 1 0 1 1 1 0 1 0 1 1 1 0 1 0 1 0 1 0 0
##  [75] 1 0 0 1 0 1 1 0 1 0 0 1 1 0 1 1 1 0 1 0 0 0 0 1 1 1 0 0 1 1 1 0 0 1 0 1 1
## [112] 1 0 0 0 1 0 1 1 1 0 0 1 1 0 0 1 1 1 0 1 1 1 1 0 1 0 0 1 1 1 0 1 1 0 1 1 0
## [149] 0 1 1 1 0 1 0 0 0 0 0 0 1 1 0 1 1 0 0 0 0 1 0 0 1 0 0 0 1 0 0 1 0 1 0 1 1
## [186] 1 0 0 1 1 1 0 1 1 0 0 0 0 0 0 0 1 1 1 1 0 1 0 0 0 1 1 0 1 1 1 0 1 1 0 0 1
## [223] 1 0 0 1 0 1 0 1 0 1 1 0 1 1 1 1 1 0 0 0 0 1 0 0 1 0 1 1 1 1 1 0 0 0 0 0 1
## [260] 1 0 1 1 0 0 1 1 0 1 0 0 1 1 0 1 0 1 0 1 0 0 0 0 1 1 0 1 0 1 0 1 0 1 0 1 0
## [297] 1 0 1 1 0 0 1 1 1 1 1 1 1 0 0 1 0 1 0 0 0 1 1 1 0 1 0 0 0 1 1 0 0 0 0 0 1
## [334] 0 1 1 0 1 0 0 0 0 0 1 1 0 0 0 0 0 0 1 0 0 1 0 0 0 0 1 1 1 1 0 1 1 0 1 0 0
## [371] 0 0 0 1 0 1 1 0 1 0 1 0 1 0 1 1 1 0 0 1 0 0 1 0 0 0 1 1 0 1 0 0 1 1 0 1 1 1 0
## [408] 1 0 1 0 0 0 1 1 1 0 1 1 1 0 1 0 1 0 1 0 1 0 1 1 0 1 1 0 0 1 1 1 0 0 0 1 0 0 0
## [445] 0 0 1 1 1 1 0 0 1 1 0 1 1 1 1 1 0 0 0 1 0 1 1 1 1 0 1 1 0 0 0 1 0 0 0 1 1
## [482] 1 1 0 0 0 0 0 0 1 1 0 1 1 1 0 0 1 0 0 1 1 0 0 0 0 1 0 1 0 0 0 1 1 0 0 0 1
## [519] 1 0 1 0 1 1 1 1 1 1 0 0 0 0 1 1 0 1 1 0 1 0 1 0 1 0 1 0 1 1 1 1 0 0 0 0
```

```r
rhyper(df$Recovered,m=1,n=1,k=1)
```

```
##   [1] 1 0 1 0 0 1 0 0 0 1 0 0 1 0 0 1 0 1 0 1 0 0 1 0 1 1 1 1 0 0 1 0 0 1 0 0 1 0 1
##  [38] 1 0 0 1 0 1 1 0 0 0 0 0 0 1 0 1 0 0 1 1 0 0 0 0 1 0 1 0 0 1 0 1 1 0 0 0 1
##  [75] 0 0 0 0 0 1 0 1 1 0 1 1 1 0 0 0 0 0 1 0 1 1 1 1 0 0 1 0 1 1 0 0 0 0 1 1 0
## [112] 0 1 0 1 1 1 0 1 0 0 1 1 1 0 0 0 0 1 1 1 0 0 1 1 0 0 1 0 1 1 1 1 1 1 1 1 1
## [149] 1 0 1 0 0 1 1 1 1 0 1 1 0 1 0 1 1 1 0 0 1 0 1 0 1 0 1 1 0 0 1 1 1 1 1 0 0
## [186] 0 1 1 1 1 0 0 0 0 1 1 1 0 0 0 1 0 1 1 0 0 1 1 0 0 1 1 1 1 0 1 1 0 0 0 0
## [223] 1 0 1 1 0 0 0 1 1 1 1 0 1 1 1 1 1 0 1 1 1 0 1 1 0 1 0 0 0 0 1 1 1 0 1 1 0 0
## [260] 0 0 1 1 1 0 1 1 0 0 1 0 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 1 1 0 1 1 0 0 1 0 1
## [297] 1 1 1 1 0 0 0 1 1 0 1 1 0 1 0 1 0 1 0 0 1 0 0 0 1 0 0 0 1 1 1 0 1 1 1 0 1 1 0 1 1
## [334] 1 0 1 0 0 0 0 0 1 1 0 0 0 1 0 0 1 0 0 0 0 1 1 0 1 0 1 1 1 1 1 1 1 1 1 0 0 1
## [371] 1 0 1 1 1 1 0 1 0 1 0 0 1 1 1 1 1 0 0 1 1 1 0 1 0 0 1 0 1 0 0 1 0 1 1 0 1 1
## [408] 1 0 1 1 1 1 1 0 0 1 1 1 1 1 0 0 0 0 1 0 1 1 0 0 0 0 1 1 1 1 0 1 1 0 0 1 0 0
## [445] 1 0 1 1 0 0 1 1 0 1 0 0 1 1 1 1 0 0 1 1 0 1 0 1 0 1 1 0 0 0 0 0 1 1 0 1 0
## [482] 1 0 0 1 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 1 1 0 1 1 1 1 1 0 0 1 1 0 0 0 1 0 1 0 0
## [519] 1 1 1 0 1 0 1 0 1 1 1 1 1 0 1 0 1 1 1 1 1 1 0 1 0 1 1 0 0 0 0 1 0 1
```

```r
rhyper(df$Deceased,m=1,n=1,k=1)
```

```
##   [1] 0 1 0 0 0 1 1 1 0 0 0 1 1 0 0 0 1 0 1 1 0 0 1 0 1 1 0 1 0 0 1 1 1 0 0 1 1
##  [38] 1 0 1 0 0 0 0 0 1 1 1 0 0 1 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 1 0 1 0 1 1 0 0
```

```
##  [75] 0 0 1 1 1 0 1 0 0 0 0 0 1 0 1 0 0 1 0 0 0 0 1 0 1 0 1 0 0 1 0 1 0 1 1 1 0
## [112] 1 0 1 1 1 0 0 0 0 1 1 0 1 0 0 1 0 1 1 0 1 1 0 0 0 1 1 1 0 1 0 1 0 0 1 1 0
## [149] 0 0 0 0 0 0 1 0 0 1 1 0 1 0 1 0 1 1 0 1 1 1 0 1 0 1 0 0 0 1 1 1 1 1 1 0 1
## [186] 1 0 1 0 1 1 1 0 1 1 0 0 1 0 0 0 1 1 0 0 0 1 1 1 0 0 1 1 0 1 0 0 1 1 1 1 0
## [223] 1 1 0 1 0 0 0 0 0 1 1 0 0 0 0 1 0 0 0 1 0 1 1 1 0 1 0 1 1 0 0 0 1 1 0 0 0
## [260] 0 0 0 0 1 1 1 1 0 1 0 1 0 0 1 1 0 1 1 1 0 1 0 0 0 1 1 1 0 0 0 1 0 0 0 1 1
## [297] 0 1 0 0 1 0 0 1 1 0 0 0 0 0 0 1 1 1 1 0 1 0 0 1 0 0 0 0 1 1 0 0 1 0 1 1
## [334] 0 1 1 1 0 1 1 0 1 0 0 1 1 0 1 1 0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 1 1 0 0
## [371] 0 0 0 0 1 0 1 0 0 0 1 0 0 1 1 0 1 0 0 0 1 0 1 1 1 0 0 0 0 0 0 1 1 0 1 1 0
## [408] 0 0 0 0 1 1 1 0 0 0 1 0 0 0 0 0 1 0 1 0 1 1 0 0 0 0 0 0 1 1 1 1 1 0 0 1 1
## [445] 0 0 0 1 1 0 1 0 1 0 1 1 1 0 1 1 1 0 0 1 1 1 1 0 1 0 1 0 0 1 0 0 0 0 1 0 0 1 1
## [482] 1 0 1 0 0 0 0 1 1 0 0 1 0 1 0 1 0 1 1 1 0 1 1 0 1 1 1 1 1 0 1 0 1 1 1 1 1 0
## [519] 1 0 0 0 1 0 1 0 1 1 1 0 0 1 0 1 0 1 0 1 0 1 1 1 0 1 0 0 1 1 0 1 1 1 0 0
```

```r
dlogis(df$Confirmed, location = 1, scale = 1, log = FALSE)
```

```
##   [1]  1.966119e-01  1.966119e-01  1.966119e-01  2.500000e-01  2.500000e-01
##   [6]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [11]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [16]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [21]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [26]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [31]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [36]  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01  6.648057e-03
##  [41]  9.102212e-04  1.966119e-01  1.966119e-01  1.049936e-01  1.966119e-01
##  [46]  1.966119e-01  1.049936e-01  1.966119e-01  1.966119e-01  2.500000e-01
##  [51]  1.670114e-05  1.670114e-05  8.315273e-07  1.879529e-12  2.260319e-06
##  [56]  3.352377e-04  1.522998e-08  3.139133e-17  6.648057e-03  5.602796e-09
##  [61]  3.442477e-14  2.466509e-03  1.026188e-10  2.061154e-09  3.352377e-04
##  [66]  4.539581e-05  9.102212e-04  6.144137e-06  9.102212e-04  3.352377e-04
##  [71]  1.670114e-05  2.466509e-03  1.233793e-04  1.966119e-01  1.049936e-01
##  [76]  9.102212e-04  2.500000e-01  2.466509e-03  2.500000e-01  4.517666e-02
##  [81]  1.966119e-01  6.648057e-03  1.522998e-08  4.539581e-05  1.233793e-04
##  [86]  1.049936e-01  2.466509e-03  4.539581e-05  6.144137e-06  4.517666e-02
##  [91]  1.233793e-04  1.966119e-01  1.966119e-01  1.966119e-01  1.966119e-01
##  [96]  1.966119e-01  1.049936e-01  1.966119e-01  1.966119e-01  2.500000e-01
## [101]  1.966119e-01  2.466509e-03  2.466509e-03  1.766271e-02  1.233793e-04
## [106]  1.388794e-11  3.059021e-07  4.539581e-05  2.260319e-06  6.914400e-13
## [111]  1.670114e-05  1.026188e-10  1.026188e-10  1.562882e-18  3.221340e-27
## [116]  2.610279e-23  1.425164e-21  2.170522e-29  1.154822e-17  3.305701e-37
## [121]  3.221340e-27  1.758792e-25  8.756511e-27  4.780893e-25  1.216099e-37
## [126]  6.639677e-36  4.079559e-41  1.688912e-48  3.392270e-47  9.221146e-47
## [131]  8.194013e-40  8.194013e-40  1.603811e-28  2.442601e-36  3.625141e-34
## [136]  3.305701e-37  9.602680e-24  6.639677e-36  1.333615e-34  7.281290e-33
## [141]  2.031093e-42  1.540088e-51  1.900620e-55  4.711166e-58  3.174359e-60
## [146]  1.580420e-61  2.639570e-66  1.037703e-53  1.950393e-65  5.583037e-85
## [151]  1.540088e-51  2.820770e-53  3.481107e-57  7.175096e-66  8.854772e-70
## [156]  6.282881e-92 1.598155e-104  5.224396e-98  4.125337e-84 2.023930e-118
## [161] 5.148200e-131 1.616088e-147 5.858548e-181 3.152008e-212 3.282425e-189
## [166] 2.729431e-195 2.416849e-264 7.393197e-271 7.476159e-314  0.000000e+00
## [171] 7.900721e-258  0.000000e+00  0.000000e+00 5.524176e-313  0.000000e+00
## [176]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 3.627172e-305
## [181]  0.000000e+00  0.000000e+00 4.800502e-220  0.000000e+00  0.000000e+00
## [186]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [191]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [196]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [201]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [206]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [211]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [216]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [221]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [226]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [231]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [311]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [316]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [321]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [326]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [331]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [336]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [341]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [346]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [351]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [356]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [361]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [366]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [371]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [376]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [381]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [386]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [391]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [396]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [401]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [406]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [411]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [416]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [421]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [426]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [431]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [436]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [441]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [446]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [451]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [456]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [461]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```
dlogis(df$Recovered, location = 1, scale = 1, log = FALSE)
```

```
##    [1]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##    [6]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [11]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [16]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [21]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [26]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [31]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [36]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [41]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [46]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [51]   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01   1.966119e-01
##   [56]   1.966119e-01   1.966119e-01   1.049936e-01   9.102212e-04   4.517666e-02
##   [61]   1.966119e-01   4.517666e-02   1.966119e-01   1.966119e-01   2.260319e-06
##   [66]   9.102212e-04   6.648057e-03   1.049936e-01   1.670114e-05   6.144137e-06
##   [71]   6.144137e-06   5.109089e-12   1.522998e-08   6.305117e-16   1.522998e-08
##   [76]   6.144137e-06   2.466509e-03   5.109089e-12   1.233793e-04   1.966119e-01
##   [81]   6.144137e-06   2.061154e-09   3.059021e-07   2.500000e-01   9.102212e-04
##   [86]   8.315273e-07   2.466509e-03   4.517666e-02   6.144137e-06   4.517666e-02
##   [91]   1.233793e-04   2.260319e-06   3.352377e-04   9.102212e-04   2.500000e-01
##   [96]   8.756511e-27   1.966119e-01   2.466509e-03   1.766271e-02   1.233793e-04
##  [101]   2.500000e-01   4.517666e-02   1.966119e-01   1.966119e-01   2.500000e-01
##  [106]   1.049936e-01   1.966119e-01   4.517666e-02   1.966119e-01   1.966119e-01
##  [111]   1.966119e-01   1.766271e-02   9.102212e-04   1.966119e-01   1.049936e-01
##  [116]   1.766271e-02   1.670114e-05   1.233793e-04   1.233793e-04   1.049936e-01
##  [121]   1.233793e-04   1.233793e-04   8.315273e-07   4.139937e-08   1.522998e-08
##  [126]   1.026188e-10   3.139133e-17   7.582560e-10   5.242886e-22   4.248354e-18
##  [131]   4.539581e-05   4.658886e-15   4.780893e-25   3.221340e-27   3.442477e-14
##  [136]   2.862519e-20   1.299581e-24   5.380186e-32   2.380266e-26   2.227364e-39
##  [141]   6.054602e-39   5.521082e-42   4.780893e-25   1.108939e-40   1.645811e-38
##  [146]   2.380266e-26   1.804851e-35   2.610279e-23   1.603811e-28   1.368539e-44
##  [151]   1.562882e-18   1.333615e-34   7.281290e-33   1.280628e-57   5.091071e-88
##  [156]   1.383897e-87   4.642456e-91   5.166421e-55   8.074507e-73   2.285694e-49
##  [161]   6.813557e-46   5.301719e-65   6.213160e-49   2.138866e-62   1.280628e-57
##  [166]   1.198363e-70   6.714184e-79   2.053885e-85   2.601073e-99   4.711166e-58
```

```
## [171]   6.890015e-89   5.440560e-75 1.076828e-106 2.739091e-119 2.023930e-118
## [176] 6.592927e-188  0.000000e+00  0.000000e+00 1.604710e-299 9.881313e-324
## [181] 3.534608e-295 2.062309e-280  0.000000e+00  0.000000e+00  0.000000e+00
## [186] 4.362053e-299  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [191]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [196]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [201]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [206]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [211]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [216]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [221]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [226]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [231]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [236]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [241]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [246]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [251]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [256]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [261]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [266]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [271]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [276]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [281]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [286]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [291]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [296]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [301]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [306]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [311]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [316]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [321]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [326]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [331]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [336]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [341]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [346]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [351]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [356]  0.000000e+00  0.000000e+00  0.000000e+00  1.000000e+00  0.000000e+00
## [361]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [366]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [371]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [376]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [381]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [386]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [391]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [396]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [401]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [406]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [411]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [416]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [421]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [426]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [431]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
## [436]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [441]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [486]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [491]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [496]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [501]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [506]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [511]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [516]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [521]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [526]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [531]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [536]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [541]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [546]   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00   0.000000e+00
## [551]   0.000000e+00   0.000000e+00
```

```r
dlogis(df$Deceased, location = 1, scale = 1, log = FALSE)
```

```
##   [1] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##   [6] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [11] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [16] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [21] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [26] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
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##  [41] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
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##  [61] 1.966119e-01 2.500000e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [66] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [71] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [76] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [81] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [86] 2.500000e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
##  [91] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
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## [106] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
## [111] 1.966119e-01 1.966119e-01 1.966119e-01 2.500000e-01 1.966119e-01
## [116] 2.500000e-01 2.500000e-01 1.966119e-01 1.966119e-01 2.500000e-01
## [121] 2.500000e-01 2.500000e-01 2.500000e-01 1.966119e-01 2.500000e-01
## [126] 1.966119e-01 1.049936e-01 1.966119e-01 2.500000e-01 1.966119e-01
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## [136] 1.966119e-01 1.966119e-01 2.500000e-01 1.966119e-01 1.966119e-01
## [141] 2.500000e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
```

```
## [146] 2.500000e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
## [151] 1.966119e-01 2.500000e-01 2.500000e-01 2.500000e-01 1.966119e-01
## [156] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
## [161] 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01 1.966119e-01
## [166] 1.966119e-01 2.500000e-01 2.500000e-01 1.966119e-01 2.500000e-01
## [171] 1.966119e-01 1.966119e-01 2.500000e-01 2.500000e-01 2.500000e-01
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## [181] 4.517666e-02 2.500000e-01 1.966119e-01 1.049936e-01 9.102212e-04
## [186] 2.500000e-01 1.966119e-01 1.049936e-01 2.466509e-03 1.049936e-01
## [191] 1.766271e-02 4.517666e-02 1.966119e-01 2.466509e-03 1.766271e-02
## [196] 6.648057e-03 1.049936e-01 1.233793e-04 2.466509e-03 1.233793e-04
## [201] 6.144137e-06 6.648057e-03 2.466509e-03 3.352377e-04 1.670114e-05
## [206] 8.315273e-07 1.766271e-02 4.539581e-05 1.233793e-04 6.144137e-06
## [211] 1.233793e-04 2.466509e-03 6.648057e-03 2.466509e-03 2.466509e-03
## [216] 4.517666e-02 2.466509e-03 1.233793e-04 4.539581e-05 4.539581e-05
## [221] 1.233793e-04 1.670114e-05 6.144137e-06 1.670114e-05 1.670114e-05
## [226] 2.260319e-06 8.315273e-07 2.260319e-06 8.315273e-07 1.670114e-05
## [231] 2.260319e-06 3.352377e-04 1.670114e-05 4.139937e-08 3.059021e-07
## [236] 4.139937e-08 1.522998e-08 5.602796e-09 2.061154e-09 7.582560e-10
## [241] 2.061154e-09 2.061154e-09 5.602796e-09 7.582560e-10 2.789468e-10
## [246] 6.914400e-13 5.602796e-09 7.582560e-10 2.789468e-10 2.789468e-10
## [251] 3.775135e-11 7.582560e-10 1.026188e-10 3.775135e-11 2.789468e-10
## [256] 3.775135e-11 7.582560e-10 2.061154e-09 5.602796e-09 2.789468e-10
## [261] 1.026188e-10 1.388794e-11 7.582560e-10 2.061154e-09 1.026188e-10
## [266] 1.388794e-11 2.789468e-10 1.388794e-11 3.775135e-11 1.388794e-11
## [271] 5.602796e-09 1.026188e-10 5.109089e-12 1.388794e-11 1.879529e-12
## [276] 5.109089e-12 1.879529e-12 2.061154e-09 1.388794e-11 1.879529e-12
## [281] 1.388794e-11 5.109089e-12 1.879529e-12 1.026188e-10 7.582560e-10
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## [296] 1.879529e-12 3.775135e-11 5.109089e-12 7.582560e-10 1.026188e-10
## [301] 1.388794e-11 5.109089e-12 2.789468e-10 3.775135e-11 5.109089e-12
## [306] 2.061154e-09 1.388794e-11 1.879529e-12 9.357623e-14 6.914400e-13
## [311] 3.442477e-14 1.879529e-12 2.789468e-10 9.357623e-14 1.713908e-15
## [316] 1.388794e-11 6.914400e-13 3.442477e-14 6.914400e-13 1.026188e-10
## [321] 1.266417e-14 5.109089e-12 5.109089e-12 2.789468e-10 6.914400e-13
## [326] 2.543666e-13 5.109089e-12 5.109089e-12 7.582560e-10 7.582560e-10
## [331] 3.059021e-07 2.061154e-09 3.775135e-11 2.260319e-06 1.026188e-10
## [336] 1.879529e-12 2.543666e-13 2.789468e-10 2.061154e-09 3.775135e-11
## [341] 1.522998e-08 1.026188e-10 3.775135e-11 3.775135e-11 2.789468e-10
## [346] 7.582560e-10 2.789468e-10 5.602796e-09 3.775135e-11 1.388794e-11
## [351] 1.522998e-08 2.789468e-10 5.109089e-12 2.061154e-09 1.125351e-07
## [356] 1.388794e-11 4.139937e-08 2.061154e-09 1.522998e-08 2.789468e-10
## [361] 5.602796e-09 1.125351e-07 1.522998e-08 5.602796e-09 1.522998e-08
## [366] 7.582560e-10 4.139937e-08 2.061154e-09 1.125351e-07 3.059021e-07
## [371] 5.602796e-09 1.125351e-07 1.522998e-08 3.059021e-07 1.522998e-08
## [376] 3.059021e-07 1.522998e-08 4.139937e-08 3.059021e-07 4.139937e-08
## [381] 3.059021e-07 8.315273e-07 6.144137e-06 4.139937e-08 3.059021e-07
## [386] 2.260319e-06 8.315273e-07 6.144137e-06 8.315273e-07 3.059021e-07
## [391] 2.260319e-06 1.125351e-07 2.260319e-06 2.260319e-06 4.139937e-08
## [396] 8.315273e-07 6.144137e-06 3.059021e-07 8.315273e-07 2.260319e-06
## [401] 3.059021e-07 3.059021e-07 6.144137e-06 1.670114e-05 3.059021e-07
## [406] 2.260319e-06 6.144137e-06 2.260319e-06 1.670114e-05 8.315273e-07
## [411] 4.539581e-05 8.315273e-07 6.144137e-06 8.315273e-07 1.125351e-07
```

```
## [416] 8.315273e-07 6.144137e-06 1.670114e-05 1.233793e-04 1.233793e-04
## [421] 1.670114e-05 2.260319e-06 2.260319e-06 1.670114e-05 4.539581e-05
## [426] 3.059021e-07 8.315273e-07 4.539581e-05 2.260319e-06 1.670114e-05
## [431] 1.233793e-04 1.670114e-05 2.260319e-06 3.059021e-07 4.139937e-08
## [436] 7.582560e-10 1.125351e-07 3.059021e-07 4.539581e-05 5.602796e-09
## [441] 7.582560e-10 5.602796e-09 2.061154e-09 5.109089e-12 3.775135e-11
## [446] 2.061154e-09 1.879529e-12 7.582560e-10 1.879529e-12 5.109089e-12
## [451] 3.775135e-11 2.543666e-13 1.879529e-12 3.442477e-14 4.248354e-18
## [456] 3.873998e-21 1.425164e-21 3.873998e-21 1.425164e-21 7.781132e-20
## [461] 4.780893e-25 1.758792e-25 1.185065e-27 9.602680e-24 4.359610e-28
## [466] 7.984904e-30 1.603811e-28 1.333615e-34 1.500786e-41 2.031093e-42
## [471] 1.108939e-40 5.521082e-42 6.054602e-39 4.473779e-38 2.031093e-42
## [476] 6.213160e-49 6.991990e-56 5.814040e-62 9.964733e-77 6.122544e-82
## [481] 2.053885e-85 3.665820e-77 7.175096e-66 6.714184e-79 1.517627e-84
## [486] 2.779630e-86 4.523982e-81 7.362997e-76 1.517627e-84 8.502954e-93
## [491] 9.710436e-67 6.375870e-59 4.642456e-91 7.070451e-99 6.282881e-92
## [496] 3.817497e-54 4.834542e-68 1.517627e-84 2.001470e-75 1.478898e-74
## [501] 9.324621e-90 3.257489e-70 2.194879e-72 3.917470e-64 1.645811e-38
## [506] 2.227364e-39 3.093350e-50 6.213160e-49 4.079559e-41 1.580420e-61
## [511] 1.950393e-65 2.345551e-59 1.540088e-51 1.540088e-51 3.221340e-27
## [516] 4.590938e-48 1.852117e-45 5.814040e-62 3.817497e-54 1.064879e-63
## [521] 6.375870e-59 2.678637e-33 1.368539e-44 5.814040e-62 1.441157e-64
## [526] 5.814040e-62 9.462629e-57 1.247946e-47 2.031093e-42 1.011221e-43
## [531] 3.817497e-54 6.991990e-56 4.473779e-38 9.462629e-57 8.408597e-50
## [536] 1.804851e-35 1.758792e-25 1.852117e-45 6.813557e-46 2.820770e-53
## [541] 1.280628e-57 7.471972e-43 5.900091e-29 6.375870e-59 4.834542e-68
## [546] 3.481107e-57 6.991990e-56 1.137980e-50 4.906095e-35 1.299581e-24
## [551] 1.540088e-51 1.441157e-64
```

```r
plogis(df$Confirmed, location = 1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.2689414 0.2689414 0.2689414 0.5000000 0.5000000 0.2689414 0.2689414
##   [8] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [15] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [22] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [29] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [36] 0.2689414 0.2689414 0.2689414 0.2689414 0.9933071 0.9990889 0.2689414
##  [43] 0.7310586 0.8807971 0.2689414 0.7310586 0.8807971 0.2689414 0.2689414
##  [50] 0.5000000 0.9999833 0.9999833 0.9999992 1.0000000 0.9999977 0.9996646
##  [57] 1.0000000 1.0000000 0.9933071 1.0000000 1.0000000 0.9975274 1.0000000
##  [64] 1.0000000 0.9996646 0.9999546 0.9990889 0.9999939 0.9990889 0.9996646
##  [71] 0.9999833 0.9975274 0.9998766 0.7310586 0.8807971 0.9990889 0.5000000
##  [78] 0.9975274 0.5000000 0.9525741 0.7310586 0.9933071 1.0000000 0.9999546
##  [85] 0.9998766 0.8807971 0.9975274 0.9999546 0.9999939 0.9525741 0.9998766
##  [92] 0.7310586 0.2689414 0.7310586 0.2689414 0.2689414 0.8807971 0.2689414
##  [99] 0.2689414 0.5000000 0.7310586 0.9975274 0.9975274 0.9820138 0.9998766
## [106] 1.0000000 0.9999997 0.9999546 0.9999977 1.0000000 0.9999833 1.0000000
## [113] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [120] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
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## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
plogis(df$Recovered, location = 1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##   [8] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [15] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [22] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [29] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [36] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [43] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [50] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [57] 0.2689414 0.8807971 0.9990889 0.9525741 0.2689414 0.9525741 0.7310586
##  [64] 0.7310586 0.9999977 0.9990889 0.9933071 0.8807971 0.9999833 0.9999939
##  [71] 0.9999939 1.0000000 1.0000000 1.0000000 1.0000000 0.9999939 0.9975274
##  [78] 1.0000000 0.9998766 0.7310586 0.9999939 1.0000000 0.9999997 0.5000000
##  [85] 0.9990889 0.9999992 0.9975274 0.9525741 0.9999939 0.9525741 0.9998766
##  [92] 0.9999977 0.9996646 0.9990889 0.5000000 1.0000000 0.2689414 0.9975274
##  [99] 0.9820138 0.9998766 0.5000000 0.9525741 0.2689414 0.2689414 0.5000000
## [106] 0.8807971 0.2689414 0.9525741 0.2689414 0.2689414 0.2689414 0.9820138
## [113] 0.9990889 0.7310586 0.8807971 0.9820138 0.9999833 0.9998766 0.9998766
## [120] 0.8807971 0.9998766 0.9998766 0.9999992 1.0000000 1.0000000 1.0000000
## [127] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999546 1.0000000 1.0000000
## [134] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [141] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [148] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [155] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```r
plogis(df$Deceased, location = 1, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##   [8] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [15] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [22] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [29] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [36] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [43] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [50] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [57] 0.2689414 0.2689414 0.5000000 0.2689414 0.2689414 0.5000000 0.2689414
##  [64] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [71] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [78] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [85] 0.2689414 0.5000000 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [92] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
##  [99] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
## [106] 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414 0.2689414
## [113] 0.2689414 0.5000000 0.2689414 0.5000000 0.5000000 0.2689414 0.2689414
## [120] 0.5000000 0.5000000 0.5000000 0.5000000 0.2689414 0.5000000 0.2689414
## [127] 0.8807971 0.2689414 0.5000000 0.2689414 0.5000000 0.2689414 0.5000000
## [134] 0.5000000 0.5000000 0.2689414 0.2689414 0.5000000 0.2689414 0.2689414
## [141] 0.5000000 0.2689414 0.2689414 0.2689414 0.2689414 0.5000000 0.2689414
## [148] 0.2689414 0.2689414 0.2689414 0.2689414 0.5000000 0.5000000 0.5000000
## [155] 0.2689414 0.2689414 0.2689414 0.2689414 0.7310586 0.2689414 0.2689414
## [162] 0.2689414 0.2689414 0.7310586 0.7310586 0.7310586 0.5000000 0.5000000
```

```
## [169] 0.7310586 0.5000000 0.7310586 0.7310586 0.5000000 0.5000000 0.5000000
## [176] 0.9820138 0.9525741 0.9820138 0.7310586 0.7310586 0.9525741 0.5000000
## [183] 0.7310586 0.8807971 0.9990889 0.5000000 0.7310586 0.8807971 0.9975274
## [190] 0.8807971 0.9820138 0.9525741 0.7310586 0.9975274 0.9820138 0.9933071
## [197] 0.8807971 0.9998766 0.9975274 0.9998766 0.9999939 0.9933071 0.9975274
## [204] 0.9996646 0.9999833 0.9999992 0.9820138 0.9999546 0.9998766 0.9999939
## [211] 0.9998766 0.9975274 0.9933071 0.9975274 0.9975274 0.9525741 0.9975274
## [218] 0.9998766 0.9999546 0.9999546 0.9998766 0.9999833 0.9999939 0.9999833
## [225] 0.9999833 0.9999977 0.9999992 0.9999977 0.9999992 0.9999833 0.9999977
## [232] 0.9996646 0.9999833 1.0000000 0.9999997 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 0.9999997 1.0000000 1.0000000 0.9999977 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 0.9999999 0.9999997 1.0000000
## [372] 0.9999999 1.0000000 0.9999997 1.0000000 0.9999997 1.0000000 1.0000000
## [379] 0.9999997 1.0000000 0.9999997 0.9999992 0.9999939 1.0000000 0.9999997
## [386] 0.9999977 0.9999992 0.9999939 0.9999992 0.9999997 0.9999977 0.9999999
## [393] 0.9999977 0.9999977 1.0000000 0.9999992 0.9999939 0.9999997 0.9999992
## [400] 0.9999977 0.9999997 0.9999997 0.9999939 0.9999833 0.9999997 0.9999977
## [407] 0.9999939 0.9999977 0.9999833 0.9999992 0.9999546 0.9999992 0.9999939
## [414] 0.9999992 0.9999999 0.9999992 0.9999939 0.9999833 0.9998766 0.9998766
## [421] 0.9999833 0.9999977 0.9999977 0.9999833 0.9999546 0.9999997 0.9999992
## [428] 0.9999546 0.9999977 0.9999833 0.9998766 0.9999833 0.9999977 0.9999997
## [435] 1.0000000 1.0000000 0.9999999 0.9999997 0.9999546 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
qlogis(df$Deceased, location = 0, scale = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qlogis(df$Deceased, location = 0, scale = 1, lower.tail = TRUE, :
## NaNs produced
```

```
##   [1] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [16] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [31] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [46] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  Inf -Inf
##  [61] -Inf  Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [76] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  Inf -Inf -Inf -Inf -Inf
##  [91] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [106] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf  Inf -Inf  Inf  Inf -Inf -Inf  Inf
## [121]  Inf  Inf  Inf -Inf  Inf -Inf  NaN -Inf  Inf -Inf  Inf -Inf  Inf  Inf  Inf
## [136] -Inf -Inf  Inf -Inf -Inf  Inf -Inf -Inf -Inf -Inf  Inf -Inf -Inf -Inf -Inf
## [151] -Inf  Inf  Inf  Inf -Inf -Inf -Inf -Inf  NaN -Inf -Inf -Inf -Inf  NaN  NaN
## [166]  NaN  Inf  Inf  NaN  Inf  NaN  NaN  Inf  Inf  Inf  NaN  NaN  NaN  NaN  NaN
## [181]  NaN  Inf  NaN  NaN  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [196]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [211]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [226]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [241]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [256]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [271]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [286]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [301]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [316]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [331]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [346]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [361]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [376]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [391]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [406]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [421]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [436]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [451]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [466]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [481]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [496]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [511]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [526]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [541]  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
```

```
rlogis(df$Confirmed, location=0, scale=1)
```

```
##  [1]  1.831804679  0.765814510  0.751402116 -1.411866923  1.085950971
##  [6]  5.186892358 -1.320380123  0.377026010 -0.329130174  4.301770997
## [11] -0.268790060  0.164377105  4.701431240  1.491335592 -0.711914603
## [16] -0.114995880  2.052210787 -2.644759363 -1.818413155 -0.979909543
## [21]  2.262902071  1.542194845 -1.331293165 -0.577579409 -1.559967594
## [26]  0.053741100  0.120193139 -0.395121555 -0.610352010  1.179438150
## [31] -0.428097289  2.752153414 -0.455195132 -1.276438240  0.739115372
## [36]  1.023080225  2.346189913 -0.182401795  0.834522149 -2.135798783
## [41] -1.433003915 -1.928527956 -2.401253542  1.597728465 -0.300577091
```

```
## [46]   1.405901748 -1.502146611   0.045807867   0.482210228   3.037377556
## [51]   1.263697133 -0.750369674   0.960588569   0.055271228 -2.438708376
## [56]  -1.958222896 -1.901145260  -1.176350875   0.685307757   0.562575331
## [61]   2.261742848  0.058871372   3.280211281   0.439357340 -1.235852276
## [66]   0.374753918 -0.902631412   1.444062140   1.181560852 -2.880305144
## [71]  -0.056369833  0.320494536   0.451584149 -0.965906906   0.568274109
## [76]   1.474231670 -0.072962097   0.278246535   0.948793245   1.002615600
## [81]   0.980769663 -0.046258576   3.585807074 -0.043897371 -2.443359522
## [86]   0.073605383  1.582265681  -1.369860714 -0.452791896   0.288892114
## [91]  -0.322455745 -1.671783801   1.393918397   2.043475724   1.212418035
## [96]  10.730893966 -0.920931640   5.803802372 -2.611831167   0.642021682
## [101]   1.396407821 -2.030576307  -0.276530297 -1.779829723   0.292761969
## [106]  -2.137115645 -0.746346767   4.438320104   1.265340534 -0.455077731
## [111]   1.404110600  1.330331391  -1.516128102 -0.599368908 -1.673070094
## [116]   0.768360162  0.655451073  -1.781762167 -0.806457330   1.912690686
## [121]   0.956520880  1.139450000   1.993747054   0.791956451   0.930008751
## [126]  -1.223011401  2.053738166  -0.769020102   0.675811839   0.242979079
## [131]  -2.702523632 -3.032011959   1.080654122 -0.014902073   0.023788922
## [136]  -1.413071928  3.972653591   0.361549049 -0.721853629 -0.982715776
## [141]  -0.143737794  0.941324869  -4.204816771 -0.948075465 -0.652387258
## [146]  -0.064998507  2.744306588  -0.212943281   0.023667827   0.339373659
## [151]   0.754006438 -0.478737395   2.829302327   0.048365657   2.483024440
## [156]  -5.080826121  3.825909210  -1.544595124   1.728039847 -1.646072907
## [161]   1.830905225 -0.741175861   2.517910957 -0.055550211 -1.635375229
## [166]   0.343445530  0.525995345   0.805627180   0.779431534 -0.798624151
## [171]  -2.215138596 -0.097109248   3.101453367 -3.915051932   2.610549382
## [176]  -0.069925050  1.524356479   0.857021040 -0.554732720   3.047878461
## [181]  -1.429197280 -2.211280818  -1.747578709 -4.258085531 -0.964513795
## [186]  -1.505535679  0.727833110  -1.091397012   3.009210813   1.033010302
## [191]   1.093819256 -0.533794074  -0.823703692   0.276439728   0.295045690
## [196]  -0.586150355 -1.313629353   0.645944461   0.918050014   2.724867310
## [201]   1.219110406 -0.576064947   4.939392196 -1.029069814 -0.310198196
## [206]   1.261514465  3.186851967   2.281894869 -0.154520084   1.708140274
## [211]   1.107156403 -1.202068557   2.258494250 -0.223743189 -0.117758150
## [216]   0.147479807  0.682602997  -3.608640006 -1.071439253 -2.707322636
## [221]   2.741209531 -0.498478627  -2.244200749   0.272335435   1.237543723
## [226]   1.444561647  0.782819569  -0.972817007 -0.810212695 -2.266183161
## [231]  -1.334630673 -1.817146288   2.104705917 -4.797875876   1.001198608
## [236]   2.868367592  2.988003704  -0.646195498   1.195153218   1.778162781
## [241]   1.900070094 -0.786932056   2.839751205 -1.051921082   1.714656334
## [246]   0.178434743 -0.113546747  -1.526374266 -0.541049424   0.149722129
## [251]   0.933133077 -0.514361301  -0.328089254 -0.575430888   0.144890700
## [256]  -0.105033302  1.021170791   4.087253853 -3.166523665 -0.749568603
## [261]   2.727749162  1.379750413  -0.704964167   4.323336970 -1.935178823
## [266]  -2.678175130  0.190098491   1.650366409   0.829062667 -0.022301792
## [271]   1.721585839 -2.329672116   0.793092906 -2.086721062   2.036480642
## [276]  -0.414460407 -1.973568825   0.190732217   0.261401301 -0.083056837
## [281]   2.550044036 -0.186313767   0.588862062 -0.584970349   0.249355001
## [286]  -0.396698105  0.921109382  -0.108739855   1.039610491   0.294762259
## [291]   0.894985108  0.546885871  -1.199293208   2.681949566 -0.827226661
## [296]   0.338768255 -0.541779727   1.485162272   1.432871915 -0.066379541
## [301]   2.702047552  2.585075481  -4.378253337 -0.604356511   2.677634945
## [306]  -1.025485074  0.178811218   1.930659162 -0.098699324 -1.564130295
## [311]  -2.105686832  2.585153193  -1.516980449   0.146736714 -1.272288631
```

```
## [316]  1.085440379 -0.848014618  1.535114898 -2.430542943 -0.825404045
## [321] -0.071976048 -0.744396565  1.740849615  0.824495072  0.691694254
## [326] -1.141756299 -0.822007474  2.465993544  0.503042958  0.708185882
## [331]  1.563311786 -1.517835033 -0.627523226  2.596407918 -0.030272828
## [336] -0.334811863 -0.612802471  0.500753173  0.972230475  0.097393507
## [341] -2.606579226 -0.470630061  0.943261210  0.931730076 -1.658564672
## [346]  3.760644906 -0.256761864  1.632553818 -0.900147717  2.850573989
## [351]  1.237772125 -0.644075493 -0.260616497 -3.853195023  2.668868309
## [356]  1.253536338  1.618817502  1.521886246  1.344402782  1.139952793
## [361] -0.311405775  0.857538964  1.563989163  1.561675466  4.077622179
## [366]  1.260258760 -1.662299806  0.572561052 -0.733851301 -0.034426880
## [371]  0.135644267  3.137948886  3.194587329 -0.101102599 -0.648814158
## [376] -2.114548387 -8.137133969 -3.646445200  2.703896926 -0.955617098
## [381] -0.094607117 -0.754682960 -0.999887984 -2.406945780  2.795425752
## [386]  1.273560097 -0.196216318 -0.265254564  2.315610474  0.102145474
## [391]  0.002893953  0.607602769 -0.326569075  0.652720537  0.709207799
## [396]  0.520716164  0.363922215  0.428900371  0.122200019 -0.889254567
## [401] -1.953994806 -0.064880508 -3.142706239 -0.597162320 -2.307942483
## [406]  0.152209553 -1.836309837 -2.756904330 -0.447069971  0.080107104
## [411] -0.689951970 -0.844281667  2.327301869 -1.819163362 -1.105358069
## [416]  1.415309472 -1.154244086  0.289452261 -0.881783940 -0.219737459
## [421]  1.392999443 -1.477798429 -6.167839103  0.502307460 -0.368315851
## [426] -1.209143303  0.413068354  0.450414109 -2.273259722 -3.208764022
## [431]  1.721307374  0.942456328  1.534742024 -0.820990408  0.162817393
## [436] -0.853243859  0.685875394 -1.277888886  2.153560922  0.356422592
## [441] -0.834709980 -1.794589017  1.848071175 -2.256347813  0.403913837
## [446] -1.096090981  2.628309270 -1.721878292 -1.017693689 -1.338449119
## [451]  0.661094269 -0.573603751 -1.517858994  1.705238591 -0.807783961
## [456]  2.734959726 -0.832764864  0.573889954 -1.155049084  0.119450983
## [461]  3.485471412  1.107771025 -0.821503215 -0.194861629 -1.120177841
## [466] -3.260163891  1.361723031  1.615742886 -0.347301835 -0.116652539
## [471] -2.014838850 -0.689892634  1.736700704  3.640613427 -0.049902543
## [476] -0.817059973  0.349884388  0.052746579 -0.744892299 -0.628164362
## [481] -0.229489091 -1.124174065 -3.740683324  0.556154958  0.329966356
## [486]  1.135035435  0.158849446  0.028802590 -0.043599709 -1.969473904
## [491]  0.826499720 -2.641676952  0.422151706 -1.129503143  1.636929725
## [496] -0.354457339 -2.004897827  1.885091642  0.896644439  2.919040409
## [501]  0.420575187  4.242236950 -0.148383742 -1.581267510 -0.121687446
## [506]  4.378673607 -0.722547177 -2.402186311 -0.513479324  1.652272483
## [511] -1.126729079 -0.511614827 -2.196375749 -0.150668524 -2.223777784
## [516] -1.957613588  0.993836464  2.173773245 -0.865025078  0.041495279
## [521] -2.055314918 -0.590872144  2.845416222  0.647074064 -1.000278856
## [526]  0.171801639  1.982598864 -0.109868492  1.860453766  1.069244672
## [531] -0.180102890  0.559731066 -1.460314986  2.056874326  2.409305839
## [536] -1.601759630  0.490719776  0.323569290  1.183067871 -1.425116536
## [541] -1.419582576 -0.424538571 -1.105560755  0.954341911 -0.570901870
## [546] -0.408932847  2.725391698  0.158221470  0.237614142  0.540425883
## [551] -0.955881712 -0.123449740
```

```r
rlogis(df$Recovered,location = 0,scale=1)
```

```
##  [1]  0.247603513  2.355257159 -0.421854838  1.728868547  0.614056730
##  [6]  0.372183146 -1.560816906 -1.690280851  1.061596238  1.295567226
## [11]  1.253613920 -0.121612318 -0.246033464 -3.027996201  0.094954114
## [16]  0.942659712  0.347637884  0.284869195  2.370709472  1.327473854
```

```
## [21]    0.116855166   1.122140872  -2.106294169  -0.340249656   2.265984420
## [26]   -0.667761913   0.360912657  -1.212800931   0.546485966  -0.527459942
## [31]    0.505538411  -1.519351474   0.623132529   1.320138468   1.465921865
## [36]   -0.275018056  -1.927635320  -0.180768968   2.299490084  -0.259010719
## [41]    3.127626533  -3.431814426  -0.190665430  -1.049965248   6.808935370
## [46]    2.316683157   3.465448438   1.667025869  -0.358579645   0.448405594
## [51]    1.353576014   1.010153560   0.303923864  -1.492913767   0.208319150
## [56]    0.175745690  -0.301248386   0.501436203  -2.281085146  -0.829174305
## [61]   -1.402720207  -0.188515201  -1.962572899  -2.458972465   1.085934505
## [66]    1.379060838  -0.270653205   0.306160120   3.923184589  -0.324907733
## [71]    1.761542141   0.300425324  -0.545311278   0.315355800  -0.207249012
## [76]   -0.511086844   1.922213863   0.880951340   0.910174331   4.505797975
## [81]    0.807162359   1.838091310  -1.576089145   1.049212639  -1.542703935
## [86]   -2.498708859  -3.357193891   0.136200263   0.089359882   0.096314366
## [91]    0.076950078  -0.306522252  -3.007867138   4.877477908   1.528203557
## [96]   -1.967036522   0.867779855   1.192117952  -1.052487568   0.974611375
## [101]   0.329134737   0.370691144  -2.331671302   0.249292127   0.716220513
## [106]   2.078595970  -0.631366214   0.345259055  -0.575957929   0.863554133
## [111]   1.762050314   0.505806565  -1.450947878  -1.126461200   0.548936448
## [116]  -1.484323367   1.185859408   0.179498661  -0.528174252  -1.273807366
## [121]   1.932380392  -0.635417389  -0.088569346  -1.761830843   0.453011909
## [126]   1.099076304   0.523342203   0.166958352  -1.655442624   0.878109048
## [131]   0.505797295  -3.835154025   2.441368823  -0.340440809  -2.946258988
## [136]  -1.900235740  -0.412643346  -0.892583795   0.217210952   1.145448264
## [141]  -0.071002186   1.017991035  -1.131120965  -0.749122709  -1.874987485
## [146]  -0.237715233  -0.737421431   2.026514209   0.318935444  -1.945484644
## [151]   1.312459435  -2.430372356  -0.497018038   0.397414903  -4.274491988
## [156]   0.421109162  -0.888148500  -1.585646912  -2.285518205   1.065396272
## [161]   1.016807244   0.198950425  -1.156342698   1.293576630  -0.858694502
## [166]   0.729318006   0.535320379   2.397446259   1.450561206  -1.045919255
## [171]   1.094490777   0.132294522  -1.569100564  -1.926079369  -1.114371456
## [176]  -2.122035698  -1.278651618   1.998168059  -2.105760974  -0.014894241
## [181]   1.332646436   0.409644035  -0.191050551  -4.912044755  -2.826452003
## [186]   0.487839479  -1.488274952  -0.583174424  -1.516400346  -0.178625398
## [191]  -1.019497218  -0.927345424   2.753579971   3.939238611  -1.794467666
## [196]   1.411757947   2.554161495  -2.311115740   0.282837905   0.141979501
## [201]  -0.970164010   0.022799328  -0.215968218   1.390088340   0.027625338
## [206]  -0.708346380   0.457296901  -0.044109128   1.031337589  -0.335583689
## [211]   0.336508772   0.034925270   1.046111201  -2.821661767   3.220435602
## [216]   0.372336136  -1.095175415  -1.501262222   1.390038080   0.437709010
## [221]  -2.797135091   2.038929410   1.846291051  -3.044043594   0.920587652
## [226]   0.665903412  -0.238641870  -1.396956245   2.098013662   0.644912022
## [231]   0.028213119   1.532561820   7.380864009   1.002397926  -3.827667331
## [236]  -5.121065016  -2.374187820  -1.025953047  -1.796454075   2.561400301
## [241]   1.281433321   0.484441327   2.696381339  -0.728778588  -1.083752440
## [246]   0.561539612  -0.717323110  -0.067549531  -3.097921459   1.557593741
## [251]   1.099866489  -0.060697364  -0.059836038  -1.799516302   0.697024113
## [256]   1.629289402  -1.477043445   1.650257598  -0.900302606   0.442685584
## [261]  -2.629062240  -0.029296105  -1.762415426  -0.008053947  -0.222034484
## [266]   1.099551480  -1.877300402   1.617178359   0.617498686  -3.580114236
## [271]  -1.046011459   0.203051449  -2.025828151   1.847634324  -0.250052866
## [276]  -0.598338566  -0.437660463  -0.689440645  -0.216522398   1.091670636
## [281]   0.545393004   1.838611565  -0.872524602   4.194040778  -0.481180788
## [286]  -0.673609771  -0.926231927  -0.607667439  -3.298482478   0.471465030
```

```
## [291] -0.594902106 -1.174247488 -1.055151665 -2.920387029  0.905626435
## [296] -1.086741439  1.869250660  1.997565810  1.173278617  0.628847336
## [301] -0.171700093  0.132478195  4.583021997  0.432127327  1.967593395
## [306] -0.915412801  1.027547142  0.369236886  2.684069293  4.930243157
## [311]  1.660430521 -0.662266877  0.679223921  0.942502934 -0.550589904
## [316]  1.334709183  1.297966901  2.139567571  0.501385975 -0.104951809
## [321] -0.259429591  0.782984052  0.080116622  0.945546141  0.321900560
## [326] -0.795952352  3.307284205  0.100882386 -0.815856394 -0.527501608
## [331]  0.429196800  0.873930126  1.494753552  1.850102753 -0.087678874
## [336] -0.013117130  4.808487095 -3.132709475  0.730250262  3.273906803
## [341] -1.820812083  0.594810745 -1.711027064 -0.192620584  0.020066174
## [346]  1.197449488 -2.521351298 -3.305098483  1.246762905 -1.249354084
## [351]  1.187412244  1.278005675 -1.642151007  2.040491636  2.458302888
## [356] -0.247784784  4.933641024  0.850972961  1.725504813  0.532064470
## [361] -2.916779370  1.813208712  1.841378566 -0.832876943 -0.758963270
## [366]  1.429959096 -0.434092897  0.910382069  0.600962618 -0.147197987
## [371]  0.126720450 -0.489036722  2.057752647 -2.225821440 -3.595683891
## [376]  0.303118135 -0.089954787  0.144759010  1.425206568 -1.148425602
## [381] -1.252237712 -1.007937843 -0.802454514  4.037460912  0.591491742
## [386] -5.868564730  3.044534518 -3.281926994  0.342339890  3.773911567
## [391] -1.163883201 -3.387619497 -3.548155966  0.008601619 -2.886822785
## [396]  2.906379760  1.648927676 -0.565327007 -1.787329961 -3.395828915
## [401]  0.673871958  0.402736083  1.992240528  0.400997679  0.522396985
## [406] -1.986638169 -0.096039635  0.035863166  3.395423769  0.503565647
## [411] -2.821686938  1.779474461  0.205442847  0.559006229 -2.523017665
## [416]  0.202277319  1.464314713  2.342117694  0.046145017 -2.335020091
## [421] -1.913172874  0.314954391 -1.338208605  2.211980668  5.659810564
## [426]  0.447758488 -1.663327848 -2.860643729 -2.060877160 -1.643440055
## [431] -1.006812732  2.105121096  0.413210982 -3.167725386  1.352007098
## [436]  0.588767583  0.227648555 -3.305785947 -2.035295881  1.709862613
## [441]  1.748130980  1.354345612  1.584545500 -0.677633292  3.593109981
## [446] -0.839078286 -0.049809292  1.590500417 -2.006860554 -4.307230587
## [451]  0.292321654 -1.259822821  2.780677935 -0.839887248  1.707984575
## [456] -0.611779323 -4.111957869 -3.812256369  2.210653515  0.990028679
## [461] -2.059269102 -0.758290102  2.289682444 -2.939990105 -0.401712966
## [466]  0.001536232 -0.613892645 -3.725091078  0.577385813  2.122613879
## [471] -0.112785277  0.405519233  0.439072979 -2.708621694 -0.644848706
## [476]  1.197146802 -0.590168581  1.432440727 -2.273776679 -0.187020286
## [481] -0.378993348 -4.676727954  0.272744881  1.079486842  0.951543085
## [486] -0.227399942  2.333494080  1.642926403  0.395583291  1.206875903
## [491]  0.875268091 -0.090969912 -1.748707355  1.311450851  0.179443661
## [496] -0.249558069  0.410801301 -0.170666993  0.287824680  1.708712949
## [501] -2.643354609 -0.161502177 -1.471315203  3.337634254  0.515362243
## [506]  0.288045961 -1.180433926  2.101497057  0.993661803 -2.840565441
## [511] -2.306520068 -1.901745831  0.175601603 -0.543515351  0.044095627
## [516] -4.184559631  2.959581764  0.298698090  0.540590506 -0.622995956
## [521]  0.961230246  0.876259535  1.780368457 -1.740685468  0.317633965
## [526]  3.901938103 -1.043242143  1.727484658  0.488053345 -0.768408004
## [531] -0.602475459 -0.598324676 -5.013944234  0.924967334  0.986943299
## [536]  0.274478337  2.336018023  1.813000745 -0.525142637 -2.540061738
## [541] -0.587639241 -0.496539054 -0.734507880  2.053586482 -0.927716801
## [546]  2.726210255  1.411650258  1.150100850  1.364839071  0.292944831
## [551] -0.598019142 -0.120917004
```

```
rlogis(df$Deceased,location = 0,scale=1)
```

```
##    [1] -1.1600997471   2.4294073559   0.9817911942   2.0295717943   1.1140705789
##    [6]  1.9636328382   0.0200673389   5.6032225046  -2.0759428055  -3.6257130022
##   [11] -1.6691869721  -0.1568212980   0.1374699793  -1.0560453805  -0.7633585628
##   [16] -2.1434941763   1.0227850898  -3.3854522525   1.0596041249   0.1635129888
##   [21]  2.1250702823   2.4029958770   1.6471472430  -1.9193584731  -0.7367061567
##   [26] -2.4232978856   2.9857194142   1.5563163093   0.8096650787  -0.2061803405
##   [31] -2.9067413825  -3.2892543887  -1.4187428643  -1.7230527651   2.7248283109
##   [36]  0.2731591617  -4.0717135880  -0.2030748526   2.2679459336  -2.2787738198
##   [41] -0.1974986816  -0.2831998329  -5.2003962230  -0.2280584491   0.0646627447
##   [46] -1.1705151568  -1.9450458128   1.3291571425  -3.5492172096  -2.8282064146
##   [51]  0.5604827449   0.2282136179   0.1332271564  -0.7551660929   1.7479017524
##   [56] -1.1680953446   1.7159383577  -0.7316719854  -2.5726557768   0.9732149090
##   [61] -0.5896134403   0.1101043621  -1.6979129369   4.2807214378   0.6790900640
##   [66] -0.1457709418   3.4254616106   4.1369117373   2.8584312160   0.5431246477
##   [71]  1.4275829875   0.5157408404  -0.5067878045  -0.6665797236  -2.0389317217
##   [76] -0.4823977467  -1.2918706621   1.2222357644   0.8062012242  -2.7475377625
##   [81]  3.8923819981   0.8390005792  -1.4575034479   0.2409778158   1.3310446412
##   [86]  2.1882245923  -0.6345722472   0.1223250561   1.4090968727   2.5256685623
##   [91] -3.5196831455   0.6629172855   1.9928579691  -3.5370533093   0.4660350249
##   [96]  1.9025897480  -1.3720094579  -1.6954821948  -0.4090534155   1.1227934277
##  [101] -4.2560730183   1.9473157329  -1.8607852538   1.6520597504   1.3193062804
##  [106] -4.2763752797   2.0169321003  -0.2458987315   0.7861568250   0.4499647625
##  [111] -1.5593522299  -1.2392153311  -0.8957833142   2.8274232825  -0.2975128552
##  [116] -0.8531280796  -0.9758769103  -2.0389147628   0.1024880547  -0.9297035053
##  [121]  1.4079254112   0.5312531659   2.1460045049   0.1064999905  -0.5573038303
##  [126] -1.1474590109  -1.1011310350  -2.4834316316  -0.6370701585  -2.5373170252
##  [131] -1.9702662906   1.6624693351  -0.9515446744  -2.9018809645  -1.0722358172
##  [136] -0.8911108395  -1.7844002410  -0.7820116667   2.9564851326  -0.4396630424
##  [141] -2.5779627069   1.6531349580  -2.5954097738  -0.9238623589   1.9629829914
##  [146] -1.6193632149  -1.9969804237   3.3497318146  -0.4336911721   0.9970615305
##  [151]  2.4383639890  -0.3834105724  -2.0413412871  -1.6767033427  -1.8881423195
##  [156]  0.6867337791  -0.3264743336   1.7140255367   0.8010052243  -1.3997414865
##  [161]  0.3708192780   0.0953556877   0.1017639516   0.6599909091   0.2925069539
##  [166] -2.2640743956  -0.3380040070   0.9740553984   0.8172075267   1.6798469466
##  [171] -0.5104983053  -4.6775876912  -0.4762505238   0.0426372191  -1.3556873349
##  [176]  4.7811798311   2.8066031373   1.1329138080   0.9375431625  -2.1675194901
##  [181] -0.0629702017   0.8101670984   2.7358857933  -0.7177827550  -0.6529896538
##  [186] -1.8243644096   1.8307439728  -1.4949068031   1.1396651197  -1.2471319190
##  [191] -1.8958427579   1.1796904801  -2.9044225746  -3.1691005618  -2.8315633212
##  [196] -2.0106347417  -0.1118810821   0.7843056660   4.3483022984  -3.0443777006
##  [201] -0.6686710213  -1.9043734049   2.2013846902  -0.7433114055   2.2258522789
##  [206] -0.7336453508  -0.5528624803   0.8068064938   0.3383608207  -1.4984432583
##  [211] -1.0713636633   0.5817068387   2.1597285258   0.8519653116   1.1734978204
##  [216]  2.1666110745  -0.3520434538  -1.1451698137   0.2460648148  -2.7283047650
##  [221]  0.0177226486   2.8534880719  -0.8294528607   0.5399893412   0.2894970216
##  [226] -1.3908054593   0.3911111699  -0.6790497703   3.8209408733   5.7612501845
##  [231]  0.0005179532   0.8895657774  -3.0481611376   2.4666130618  -0.5478332262
##  [236]  0.0498545400  -0.4553621518   1.1633713819   1.9666691016  -1.5350106575
##  [241]  0.1033727026   2.5901578661  -1.9701354597   1.3226799492  -0.1765171024
##  [246]  0.3079147923   0.6453194027   0.4399879944  -0.3214151127  -2.0254778117
##  [251]  1.1054086046  -1.1488770860   1.1711110061  -0.4258686599   0.2016659735
##  [256]  1.4404692269  -2.3350394728  -0.4069366083   0.9647622189  -2.8120126557
```

```
## [261]    0.4676454020  -1.6442903466   1.0318425694  -1.5032173498  -0.5120962004
## [266]    1.8694426522  -2.0076504235  -1.1294903201  -0.5814312104   1.2064315483
## [271]   -1.1979731642  -1.0842661892   1.2984156411  -0.5154076248  -0.4435253517
## [276]    1.9668965759   3.3081182898  -0.9491598480  -0.6091557145  -1.4299795799
## [281]   -0.3030200141   2.7466063066   0.4838295701  -2.2650875570   0.1360219702
## [286]   -2.5099891046  -2.2022837343   0.1325656941  -2.9509560719   0.4504172317
## [291]   -2.0141003211   1.6711246821  -0.7343696006  -3.2554497133   0.5412309509
## [296]   -3.4606085223   1.1464913843  -0.0465025987   1.8933054912  -1.3518514385
## [301]   -0.8989011281   1.5034379464   0.8029899509  -3.4130738555   0.9386487037
## [306]   -0.6539131692   0.4192467263  -1.3055692364  -6.2472946317  -5.3319289767
## [311]   -0.0498105720   0.4342122191  -1.4537080599   2.0299226662   1.7478874765
## [316]   -1.3619092393   2.4713586476  -0.1895731773  -0.2238911839   0.0027894088
## [321]    1.4067438016   0.2715656508   1.4105216110   1.1829132165   0.2230334918
## [326]   -1.4328535651  -0.6303035922  -1.5798845291   4.3497490290   3.6257964565
## [331]    0.1321314539   1.2528307701   2.7913678315  -1.6375534427   0.2008843283
## [336]    0.3778182785  -1.1341559773  -1.7893758911  -1.7224252001  -2.7961153614
## [341]   -3.2540265295  -1.0143599432   0.0913206114  -0.0629694699  -4.0446780374
## [346]    2.8558693403   3.4665566449  -1.0167712476  -2.3236128809   2.8084065827
## [351]   -0.5075884908   1.7608837396   1.9078321713  -0.9830497314   1.5107164139
## [356]    0.7147806479   0.9626977837   3.9984840202   1.4591812889   0.0551501053
## [361]   -0.0540371170  -0.9975733070   0.3745932400  -1.7371801321   3.6245108261
## [366]   -3.0600699349  -0.2109113353  -0.5251198391   2.0348329207  -1.6766759610
## [371]   -0.9135805459   2.3879602869  -2.7508018639   1.5756133139   3.6202644564
## [376]    2.1660870620  -2.2392628832   1.0468500904  -3.9359893051  -0.5030644895
## [381]    3.9899063295   0.0524998318   0.6820915408  -1.6306227337   2.8328951430
## [386]    0.4234385363   0.2525630549   2.0540518555  -0.4885455351  -1.0081056182
## [391]   -2.8220203395   0.1995618736  -1.1931264116  -0.7285034042   2.6972839924
## [396]   -2.2053007035   1.0444557197   1.8098631634  -2.4592713804   0.1305846556
## [401]    2.2352579949  -0.4424840213   0.4589292355  -0.3833814890  -1.6448865109
## [406]   -2.1246921926  -0.3347997898   2.3189438573  -0.7020866366  -2.7503408459
## [411]   -2.3286964224   1.9757690290   2.2490794211  -1.8622182114   0.7964885002
## [416]    0.5583800535   4.5460843720   0.4136924153  -1.9691891383   1.5012666977
## [421]   -1.0546453326   0.4044557711  -0.5087288303   0.0145410272  -0.5377236975
## [426]   -1.8986036755   1.7580376440  -0.1058986110  -0.1696451531  -2.7665951783
## [431]    0.7999635561   0.5120984551   1.0882451858  -0.2433728759   1.4118046754
## [436]   -4.3955360111   2.3512739241  -0.5371000503   4.1486145573   3.4823827353
## [441]    0.5006861466  -0.7275065752  -1.4056367957  -1.0466967755  -0.2765293322
## [446]    0.9263068475  -3.2332094253   2.5582741780  -0.7491319793   0.4554089102
## [451]    0.2578550801  -0.3421066157  -2.0531425593  -1.5362025161  -0.7220096028
## [456]   -0.8312141101  -1.0450579240   1.4265314502   0.8451287393   0.5417160829
## [461]   -2.8888565566  -0.5990079236   3.1785627866   0.5403716072   2.1404469253
## [466]    0.8721454615   1.3848269404  -0.3377570094  -0.1852553926   1.8240776140
## [471]    3.0427134489  -2.1913986565  -1.2029214995   0.6510517097   1.0079044624
## [476]    0.7138636107   1.6669407734  -0.7088044260  -1.5169363358   0.4410632311
## [481]   -2.1923648756  -1.7193153170   4.8362732079  -0.2489865442  -0.1714134779
## [486]    0.5737728759  -0.3688155821  -3.2119812109  -0.7881112456   2.5199879505
## [491]    1.1684408454  -1.6456033146  -1.1832185596   0.5137934862  -1.5786633357
## [496]    0.2273771133  -0.3865556616  -4.1220030794  -0.4910899658  -3.2184212409
## [501]    1.4340396772  -1.3676129218   2.7591254243   1.2227511690  -0.2457241775
## [506]   -0.8194516366   0.6552040664  -0.4365751068   0.0668748881  -0.3190397865
## [511]    0.4771319750  -1.5888633260  -2.0212291367   0.7181001951   5.0597931710
## [516]    0.0682237086  -0.4531328723  -1.5141742700   2.1439053448   1.8871433412
## [521]    0.6713499854   0.6891865180  -0.4837049821   0.8743803113  -4.1950675608
## [526]   -3.3478108159  -0.0161330520   0.8644305332   2.3227670769   0.7855369955
```

```
## [531] -5.2294066011 -0.4494918350 -1.5918862381 -0.5063785812 -0.5635538409
## [536] -2.0173761827  0.3781294365 -0.2962820426  3.5115702373  0.8065117103
## [541]  1.2311238916 -1.6532566561  1.5452542292  3.3787168460  6.3368059873
## [546] -1.5840199815 -2.2182441771  2.3533731793  1.4312732373 -0.0127075888
## [551] -3.5925268014  1.7171660122
```

```r
rlnorm(df$Confirmed, meanlog=0, sdlog=1)
```

```
##   [1]  0.35638659  0.55636686  0.81157807  1.25388109  0.84575262  0.65045264
##   [7]  0.39901378  2.59500312  5.82382887  0.78262210  1.03119232  0.51077488
##  [13]  2.97006099  0.86717062  0.84675905  1.51010799  3.16853896  5.65850602
##  [19]  0.64486521  1.20932904  0.92032944  0.80337425  1.00908232  0.84289592
##  [25]  1.45986617  1.09560605  0.35765403  0.98298610  3.61044904  0.38170714
##  [31] 11.88983670  1.56725296  0.56621038  0.22899397  2.41889648  2.48435480
##  [37]  2.37960432  1.16378948  0.89515327  0.72003187  1.11071237  0.68286114
##  [43]  1.10383089  0.70941486  0.85444400  0.57033541  0.36397754  2.52987363
##  [49]  0.67320076  0.73289009  2.08009516  0.58278858  0.48103872  0.09022147
##  [55]  0.56525122  3.55831346  0.91799660  2.83527686  2.58494881  1.30266581
##  [61]  1.89488505  0.53059860  0.69924461  2.43815644  0.43466266  1.09308668
##  [67]  0.83384925  2.27444774  0.76458281  0.09968930  0.75323079  2.32839149
##  [73]  1.36372968  2.71801460  0.69056245  2.88288856  1.37349061  0.71992777
##  [79]  3.84500037  1.52603541  9.86710499  3.55794059  0.92364931  0.24710702
##  [85]  0.76222072  4.03357133  0.13352378  4.16221455  0.91319742  5.29579085
##  [91]  0.37217749  1.04049767  0.40765170  1.93358255  0.17098065  5.90973598
##  [97]  0.10195489  0.17729781  1.74775323  2.21198853  0.47526074  1.08284685
## [103]  0.73606244  0.31636345  0.33201841 13.63065014  1.59020867  0.55758434
## [109]  1.55370788  0.80308341  0.95281355  0.99602531  4.07108155  2.09921284
## [115]  1.75760952  4.59881425  0.24151895  0.45905127  0.69736695  5.27567046
## [121]  1.42651396  1.36332549  1.28868877  0.60869131 10.07494159  0.42199074
## [127]  0.26945546  0.82519381  2.76199916  1.07973831  0.96953082  0.93945524
## [133]  1.33800392  0.78609882  0.49778176  1.43264751  1.45366036  0.92308042
## [139]  5.52318052  0.49221413  1.45323785  3.35656688  0.47752745  1.75316802
## [145]  0.48337581  1.13534689  2.25077975  0.20301727  1.07294852  0.30810014
## [151]  1.41892276  0.35006359  0.39473649  1.10629014  0.34517404  2.23049491
## [157]  1.56649156  1.44764095  2.98871740  0.32320810  2.28196534  2.14311088
## [163]  1.24390515  0.31223426  8.52857905  2.19343937  0.26986681  0.37363285
## [169]  1.28609432  0.82566620  0.35589607  2.21838466  0.53515295  0.68431096
## [175]  0.54704407  3.97104996  0.32800549  0.82349996  0.38622891  0.31457216
## [181]  2.17344073 11.21210034  5.34687845  0.75131783  0.20196813  0.80602834
## [187]  0.08465675  0.19643909  3.40935672  3.46551388  1.89198273  3.59305687
## [193]  0.44712948  1.50445633  2.36065528  1.13314497  1.12899916  0.14786757
## [199]  1.25191183  2.23233555  1.32766522  6.00201403  0.46817451  0.55743196
## [205]  0.20727320  0.45092783  2.94333972  1.15824496  0.89051183  2.59379631
## [211]  1.95116483  0.48269591  0.20218329  1.24647673  0.69720164  1.01695099
## [217]  0.35364125  4.07494488  0.43412227  3.99325490  1.28015124  0.27194692
## [223]  0.51069592  1.23998384  1.20127319  1.48304893  1.45974313  0.70599645
## [229]  0.41652118  1.18235102  0.80644767  1.95518463  2.24756697  2.15612855
## [235]  1.28984437  0.89248417  0.37034035  2.18731323  3.01514132  2.67082222
## [241]  1.49650315  2.17887252  5.49229290  1.54097947  1.14074343  3.59800891
## [247]  0.77411198  3.17883497  3.54652301  1.29420448  2.71694633  0.07785803
## [253]  2.71146638  0.45870137  0.80907612  4.15742457  0.87597674  1.42624724
## [259]  2.63557825  0.70549634  1.36472120  0.24929743  1.29316133  1.38701786
## [265]  0.87698841  1.12387350  0.38127669  0.22280754  0.55725596  5.86683680
## [271]  2.35168657  1.58011343  1.06765973  2.97513199  0.74014918  3.42652776
## [277]  0.27995344  0.39802053  4.62278290  0.50024668  1.02067103  4.33892448
```

```
## [283]  4.39027684  0.85152650  2.40739574 13.34386702  0.58404703  1.65390244
## [289]  0.74112781  3.99389692  0.38102485  1.85536032  4.91718237  1.17073516
## [295]  1.79300756  1.81487136  0.95137961  1.02147615  0.56959274  3.13893713
## [301]  2.69461962  2.52192839  0.36005473  0.40030432  0.84009339  0.40987644
## [307]  1.00549154  0.24439737  1.33234122  0.76543683  2.39232990  2.36342204
## [313]  3.68382003  0.29248640  2.39579582  1.39765781  0.43943209  2.64730962
## [319]  0.12060631  1.11438728  2.07528009  0.56237193  0.55238611  0.53729352
## [325]  0.09494182 11.20373284  0.55521996  0.71674812  0.39520290  2.64711991
## [331]  1.75890919  0.53340192  0.42564512  0.24071486  0.24455985  0.11797119
## [337]  0.68961036  2.37979804  1.25770007  6.59163297  2.81075536  0.47072137
## [343]  0.76155269  1.60350518  0.71074572  6.51543206  1.81225941  0.59688304
## [349]  0.71966827  2.60661476  0.81429136  0.34149944  0.73663588  1.04982815
## [355]  0.73197764  0.93521356  1.57512706  0.43043222  1.03944724  0.19062179
## [361]  3.68846566  0.46896715  0.66868239  0.50940206  2.28893282  0.70846270
## [367]  0.63983862  2.07230715  1.48883425  3.33660929  0.87601305  0.04460822
## [373]  0.07896018  2.51203769  0.33497950  0.90240396  0.66569781  2.69807772
## [379]  0.60965064  3.18490215  1.78261334  1.41958596  0.29026983  7.23333595
## [385]  1.70029657  1.17315017  0.98389787  0.71787365  0.73905844  5.33194922
## [391]  0.66516269  2.37779563  0.86910849  0.50893884  1.52499394  0.47895564
## [397]  1.77734028  0.74029549  0.67942584  4.76477741  0.49583553  0.29239119
## [403]  0.17719932  0.11789798  1.05538317  0.26988200  0.14851324  0.42794066
## [409]  0.94407744  0.40198996  0.44517592  7.25169731  2.72111458  0.74122144
## [415]  8.16928805  0.39170046  0.18048367  7.20489607  0.47342299  1.97949355
## [421]  1.72257839  0.58461623  0.12517449  1.42618349  1.57166416  0.24923037
## [427]  2.27576712  0.99251556  0.74615885  0.62132973  1.49596669  5.05538574
## [433]  0.49922329  0.96066282  0.46791790  3.59858195  0.74506046  1.13578103
## [439]  0.91729232  0.89248170  0.86508034  0.32038450  2.49196749  0.72666726
## [445]  1.12692479  1.37916868  2.04326702  0.27611313  3.53289439  0.78974787
## [451]  0.57302105  3.01670805  0.66585937  0.61138392  0.71597147  1.54811719
## [457]  1.58352501  2.48831270  1.92190963  0.09142570  1.54110291  1.02040567
## [463]  0.89584684  0.31066535  0.51972692  0.71070153  2.04035103  2.45664716
## [469]  0.31724751  2.38167526  2.83346946  0.22752607  0.66605850  1.66288359
## [475]  1.25264901  0.53672021  0.18026363  1.16786144  0.47653332  0.80226918
## [481]  0.38201326  0.57859803  0.65325807  3.96380916  0.33209261  1.12217996
## [487]  2.45612532  2.40464012  0.42144028  0.52221818  0.48401246  0.13714648
## [493]  1.13940423  0.92742667  2.24943266  2.05455741  0.95748548  1.14375001
## [499]  0.92277520  0.52267752  0.55185454  0.63783777  0.77914876  2.51943008
## [505]  2.10237971  0.16419362  0.35047145  0.33646354  2.38213365  0.89251724
## [511]  4.25886419  1.05974449  1.72577382  0.14932034  1.00986069  0.33771135
## [517]  1.95429935  0.16926539  1.63279681  1.57104066  0.31379325  0.68354572
## [523]  0.20093841  1.07859681  0.82271264  1.24093780  0.73911665  1.09454564
## [529]  0.91662263  1.56921914  0.47156836  4.55851188  0.24775071  0.57478767
## [535]  2.03594216  1.19910668  0.84908684  0.48247688  0.99421341  0.15049676
## [541]  0.83055789  0.75832383  0.11292020 18.89986689  0.59221134  4.35202934
## [547]  3.20252208  2.60951631  2.85714999  0.14014567  0.62843464  2.80416459
```

```r
rlnorm(df$Recovered,meanlog = 0,sdlog = 1)
```

```
##   [1] 24.23438849  1.52496134  0.79687117  8.42966458  2.39909239  0.38578947
##   [7]  5.65866511  1.94731834  3.12084329  3.04070135  2.66207128  1.76698736
##  [13]  2.40616683  0.97670318  0.35458060  2.50781294  0.28178908  2.56238015
##  [19]  1.25530004  2.50345627  1.13595227  2.03795805  0.61119119  0.31171052
##  [25]  2.37127545  1.71625149  1.18277526  0.58505809  0.16387207  1.41625067
##  [31]  1.01649022  2.71601652  2.05076388  1.94861690  0.11244110  0.81432138
##  [37]  2.23800164  0.62565565  0.41461628  1.77689938  2.59877548  1.97305416
```

```
##  [43]  0.21775374  0.57302136  8.54226166  1.47058098  0.17634429  0.99901320
##  [49]  0.25738939  0.60849237  2.69631329  1.72519187  0.49934736  0.47327874
##  [55]  0.26512118  0.16878538  1.66951544  2.34782101  0.96810285  0.28275601
##  [61]  0.26881967  1.27478703  8.74519561  1.08969561  1.03788125  1.48501543
##  [67]  0.34017432  1.96719150  0.55944282  0.97208612  0.14082984  0.80911569
##  [73]  8.77692190  0.43270737  3.58790474  9.27113301  0.90055015  1.75030164
##  [79]  3.59221037  6.26355272  0.91322397  0.73708419  0.58247265  0.55764219
##  [85]  0.96410771  0.66592107  1.24095147  4.14056271  2.19405147  1.89676054
##  [91]  1.88950239  2.85773475  0.81036026  0.36280632  1.75311928  0.45999540
##  [97]  0.50832995  2.86684701  0.45461141  0.93685943  0.86408309  0.41025513
## [103]  0.76797539  0.52833390  0.94513442  1.22078080  0.44056882  2.22039651
## [109]  2.90798858  1.73247879  0.48398038  1.10307856  2.96690728  1.20377048
## [115]  0.94355884  0.82890333  0.91479063  0.31614200  0.65275599  0.29396365
## [121]  2.69359341  1.85782629  1.29636953  1.79321067  3.76753131  0.79040290
## [127]  0.59656476  0.61212027  0.31487029  2.58691040  0.50496860  1.74588371
## [133]  3.36043182 10.34369719  4.60013060  0.96914641  3.08847366  1.09103728
## [139]  1.69741509  1.50549529  0.38744747  3.32692466  0.53266526  2.17486112
## [145]  0.40008562  0.55443113 10.91886668  0.66510534  0.83723378  0.69373801
## [151]  0.81249053  1.25445495  0.97764280  0.26188202  0.63630917 12.47892616
## [157]  0.83520738  0.65659813  2.83337736  0.91113770  1.38150643  0.32984839
## [163]  3.97972128  0.97296234  6.21872818  2.09899249  1.22842129  2.47651833
## [169]  1.01978860  0.20316458  1.06627007  9.83457501  0.58175635  1.62455463
## [175]  2.65254034  2.21892487  1.92975573  0.99295593  0.55520687  0.64525759
## [181]  1.17466548  0.27083784  0.77135701  0.53562228  0.67502445  0.25612922
## [187]  0.71823508  1.70839218  0.32343169  0.45260501  0.63975875  0.09167021
## [193]  0.28977771  0.45269938  2.20914083  1.45131969  0.99371326  1.34052178
## [199]  0.84144936  0.83507988  1.86113165  0.32278276  0.22125954  0.32368419
## [205]  1.66992151  0.02744546  0.92194382  2.40082204  3.36471035  1.83527277
## [211]  1.92626937  2.96399108  0.24826536  1.98162977  0.81596723  0.61079585
## [217]  0.58284820  0.69783344  0.26998210  0.18611714  3.16632763  1.94467751
## [223]  0.77283538  6.41889657  1.75384254  2.72019001  1.42169111  0.71993109
## [229]  0.81916820  5.50353929  2.03479055  1.15492910  0.76394101  0.98338864
## [235]  0.25768193  0.47612309  2.15674367  0.34098023  1.51608948  3.05716472
## [241]  0.26961606  0.89744015  0.36894675  1.73838025  0.86162821  0.14447690
## [247]  0.70016939  1.13939557  2.65763273  0.21278852  6.52986240  0.42550193
## [253]  0.30877059  1.06771152  2.67175325  1.40137583  0.24629965  0.21850099
## [259]  1.10192717  0.49565362  1.50060220  0.83031520  0.45966442  1.06479369
## [265]  0.17889943  4.62699396  2.63980610  1.99745902  1.27361791  2.15701165
## [271]  0.83195016  1.22824973  0.17989922  3.25919611  5.06265167  1.07738274
## [277]  1.42293523  0.60812471  7.02897164  0.51977979  0.92828629  1.33664234
## [283]  2.06825607  0.78302693  0.44712729  1.60992487  0.78240544  0.56277165
## [289]  0.32581816  1.13581781  0.50525854  1.63038961  2.17444988  2.79965755
## [295]  0.11524325  0.29112280  0.24287720  3.63011492  1.52366587  0.76731987
## [301]  3.20986789  3.69365642  0.69278249  1.93765975  2.63590263  2.96669560
## [307]  0.66942359  2.49310369  2.41681823  0.76211677  0.30917097  1.58107629
## [313]  0.99815641  1.99312721  1.07588314  1.43374449  0.97897660  0.28934632
## [319]  3.50554063  0.86750347  2.28642023  0.20993762 13.75032894  0.72217243
## [325]  1.31232782  2.00049448  1.27910108  0.90754511  1.13249549  3.28187402
## [331]  2.11500088  1.58820693  6.96036100  1.18565240  0.81935601  1.41886896
## [337]  0.35706418  0.74604549  2.27211547  0.44449517  0.13850764  1.56211501
## [343]  0.76426959  5.05433176  1.84093693  1.22097675  0.67836183  0.29467246
## [349]  3.66250908  1.94832582  1.18242923  0.20064619  1.01579196  0.43867455
## [355]  1.93384360  2.35021007  5.54724453  1.60849934  1.46868339  0.12540887
## [361] 10.51050767  0.51938892  0.44269814  0.08333745  1.27763274  0.58391377
```

```
## [367]   1.36051017   0.35918591   0.50861623   1.63990823   1.30562381   2.48476050
## [373]   0.69979292   1.62602030   5.37916889   3.97479483   1.90537119   0.39285440
## [379]   1.16033363   2.04755136   0.40552352   0.44908238   1.22389073   3.62864830
## [385]   0.65391245   0.33735161   0.39049837   0.86941257   0.71079488   0.43132278
## [391]   0.37444147   0.82675555   1.07839368   1.15616933   1.01466197   3.30360988
## [397]   0.56133060   0.15459515   5.23336494   0.51837885   1.33914291   1.51478716
## [403]   1.38396153   7.81698715   1.07343550   0.46859923   0.81595924   1.51939030
## [409]   1.19530653   2.55000444   1.90552881   0.79254368   2.62192332  12.04713978
## [415]   0.70835122   0.43139656   1.98943876   0.55882065   0.38402672   0.36219677
## [421]   0.21358528   1.02705423   0.44935096   2.88872762   0.50795627   1.13197854
## [427]   0.61003941   2.71530714   3.31323348   0.17861673   2.75221985   0.16979277
## [433]   0.88293834   0.68584351   2.32265408   1.14371934   0.29483796   1.31490715
## [439]   0.99918623   0.97266261   2.29157213   0.55209269   0.53884335   0.97616850
## [445]   0.81220869   0.25888283   0.36592395   2.16855474   2.28593450   2.57106341
## [451]   1.75826199   2.19879724   0.13802067   1.69429266   1.51893014   0.74338872
## [457]   6.50315409   1.42603626   1.60220603   0.80551294   1.39519359   2.00402272
## [463]   0.95354326   0.62918467   1.16290907   0.53186813   0.48708962   0.77943788
## [469]   0.53152543   0.36898032   2.04553980   2.77361487   0.24415829   5.79157434
## [475]   0.19942478   1.06525874   0.65056318   0.31099628   0.22456970   2.48215010
## [481]   0.14294943   2.98500995   0.88471095   1.70540502   0.50119481   0.25992641
## [487]   3.46834710   3.97776544   5.74252216   1.14641824   0.14078916   2.28973611
## [493]   2.35222658   1.83881904   1.74797719   1.15328025   0.40848279   0.13601272
## [499]   2.15976166   1.07920026   0.91084310   0.15444878   0.44059982   1.77555438
## [505]   0.31770988   4.82737174   0.70517646   2.79676787   1.32663679   6.05308939
## [511]   4.48664202   2.59360334   0.70618974   2.47164536   6.48576497   1.66098115
## [517]   0.43251942   0.79043697   1.82091293   0.62133862   0.48346172   0.72726481
## [523]   2.39541080   1.19327754   2.69456004   0.93532662   0.97486995   1.04401786
## [529]   1.31503739   0.68081218   0.57130268   1.49341657   0.37229372   0.99271817
## [535]   2.40156659   1.46527866   1.11318033   3.44479166   0.76655466   1.99049816
## [541]   0.21248163   0.97041816   0.76464932   0.31113961   3.38661336   0.70997419
## [547]   0.33464343   0.84056527   0.35587599   0.94048050   3.44407376   1.37265398
```

```r
rlnorm(df$Deceased,meanlog = 0,sdlog = 1)
```

```
##   [1]   0.30187473   0.47780972   0.56435205   1.60074025   0.78881276   0.64775478
##   [7]   0.56191260   1.59197277   0.09905871   0.42456863   2.06424809   1.12343941
##  [13]   1.79523591   1.68742963   2.00986162   3.27220952   6.07917502   0.67116321
##  [19]   0.71574102   2.01520198   1.74173356   3.01882588   0.47075027   1.65326855
##  [25]   0.97249670   1.52363679   0.84618126   0.68338221   4.31277075   0.94279623
##  [31]   0.56925438   0.57919600   0.60852198   0.73761028   0.27973189   1.50122972
##  [37]   4.76734757   0.64120990   0.17895314   2.45361482   0.81492650   1.14539442
##  [43]   7.60666528   0.42517626   0.71860443   0.63924085  11.30868944   0.60741689
##  [49]   0.41517356   1.32757994   1.48613400   1.55861255   0.55590410   0.70238652
##  [55]   0.99354283   1.19816683   0.68734422   1.61901295   1.01548167   0.04937948
##  [61]   2.12928687   0.62766743   0.28710427   5.71136235   1.01311131   0.43399847
##  [67]   0.90840422   0.60844338   1.19311921   0.56713910   0.32881077   1.02038145
##  [73]   0.50487338   0.52939565   0.37243878   2.82207653   0.33117573   0.87816090
##  [79]   9.74842410   2.36161112   1.12277233   3.05684879   2.93725256   0.71070701
##  [85]   4.30572217   1.28955963   0.54595796   3.87462182   1.18810079   0.21376070
##  [91]   0.70923540   0.75046445   0.85783081   0.18111106   0.86950823   2.37517299
##  [97]   0.84879290   0.64142726   0.27106490   0.65971243   1.53320456   0.41897233
## [103]   0.53305905   6.06450374   2.77808015   0.71707580   2.78326655   0.50012961
## [109]   4.05153273   0.36064239   4.87424762   0.55699049   0.21114250   8.07594998
## [115]   0.85045022   0.90581078   1.02412186   0.19527575   0.51892375   0.48021413
## [121]   0.57344620   0.37612708   1.46471143   0.21504481   2.23574927  13.76506216
```

```
## [127]  1.12727801  0.76549568  1.75094539  0.92209300  0.60037539  2.55209873
## [133]  0.98090297  2.06705607  0.83417446  1.26623788  0.45070659  0.81661434
## [139]  1.24533920  0.80249281  0.45587342  2.30441875  1.64735288  1.12656512
## [145]  0.31348781  0.82145415  0.18530201  3.30697476  1.94914851  0.86549084
## [151]  0.11657244  0.35951290  5.58619150  4.44746307  0.63960979  0.03053173
## [157]  1.34266096  2.70794794  0.38821176  1.99650017  1.22684625  0.37644722
## [163]  0.50208324  0.28668763  1.49204558  0.71817918  1.82434841  1.82537795
## [169]  2.15008674  0.10274530  0.76177477  1.69030222  4.74258278  0.83662916
## [175]  3.16103783  2.71865780  1.30928408  3.28958050  1.42545747  3.44767083
## [181]  2.45975551  0.07816458  1.62093994  2.12161277  1.37828796  4.02819492
## [187]  1.25293635  0.18798357  1.53843084  5.09535474  0.73286344  0.31429998
## [193]  0.33635656  0.55909352  4.26160706  3.88961960  0.47396997  1.44017467
## [199]  0.93067535  3.57865814  5.20918355  1.20632942  0.61278488  0.24855168
## [205]  2.07391881  1.94198394  0.54008571  8.10281868  0.79118175  3.74760980
## [211]  1.70786386  0.65312590  1.17072858  0.12085352  0.96724855  1.68586324
## [217]  3.58871992  1.75882085  0.46895767  0.54171202  6.12629481  0.71456373
## [223]  1.01107785  2.15999487  1.09196396  0.99811577  0.54904418  1.88486514
## [229]  0.68771691  1.39899550  0.48723400  6.56242539  0.30767399  0.38659823
## [235]  2.52852622  0.64845597  1.01535555  0.26902963  2.47982649  2.47238284
## [241]  2.72625417  0.60718490  0.42865707  0.50617092  0.23224152  0.50145982
## [247]  1.18139450  0.33062068  3.56091348  1.61049324  0.87407959  5.71773262
## [253]  1.52633389  0.65407041  0.55290451  1.68152869  0.71573505 11.67435473
## [259]  0.50227699  1.73014924  2.97228314  0.27455582  0.97485319  0.51232592
## [265]  1.10398441  0.47492727  0.38195432  0.36602783  1.01260436  0.92727764
## [271]  1.11339296  0.93843055  1.69205558  3.49049421  0.08891128  0.67078073
## [277]  8.87386584  0.47252784  1.21563221  0.41331635  1.30148174  0.34459211
## [283]  0.37487364  1.89778557  0.23767408  1.41544231  0.30396955  2.59359194
## [289]  2.61062702  4.04887334  0.51467511  0.59300680  0.34361477  0.29220335
## [295]  1.53082363  1.46613738  0.79819334  1.70214177  0.84240811  1.45630899
## [301]  3.18947954  0.24546152 16.98555661  2.94757844  0.36592845  3.88157420
## [307]  0.29599686  2.29908382  0.59916370  0.67080886  1.02305085  1.87720405
## [313]  1.57609940  0.80309279  0.80281236  2.10000188  0.30519652  0.33824605
## [319]  1.89126443  0.29990199  2.54390972  1.36293916  2.01506617  1.01617711
## [325]  1.82701607 10.81687474  0.46527797  0.92678774  0.72780138  0.87008495
## [331]  2.55514738  0.06876342  0.98165694  0.53466843  3.62745801  0.38873587
## [337]  3.08657333  1.51428397  0.55850438  2.37636858  1.22631814  2.02641324
## [343]  3.12820632  1.27831487  0.81498029  0.17394481  0.09221714  0.55831011
## [349]  1.59321161  3.83045001  4.04053822  5.42457514  0.45526209  0.42394857
## [355]  0.21051973  0.16560637  0.89140087  3.87241825  0.24772946  0.58066809
## [361]  2.26269566  3.86058327  0.71917705  0.61189546  0.91693279  0.78536907
## [367]  0.51829094  5.33345031  0.19987648  0.44729004  2.90965536  1.26266856
## [373]  1.46221662  0.55785861  2.92180121  1.10740601  1.75965351  2.75463468
## [379]  0.91433003  0.63709971  1.17941740  0.73931084  1.51741445  0.49453132
## [385]  0.31100495  0.10786893  1.80786557  2.72023191  0.96514088  1.05895790
## [391]  0.73421591  2.37489617  0.76515619  0.30796595  8.20173181  0.29129784
## [397]  0.64804470  6.20730746 36.85232358  0.89752141  0.86424051  0.23106700
## [403]  0.71598494  0.37165186  0.38744290  1.54290923  2.25891014  1.08483460
## [409]  0.73835308  7.28874261  2.30672818  4.38487173  0.88886853  0.54119328
## [415]  2.72816329  3.23074276  0.10259922  3.46697943  1.68969961  1.85512490
## [421]  9.81346699  0.64053089  2.91352426  0.32668800  0.70999694  3.08443924
## [427]  0.72858853  1.59044029  0.35647256  0.92378832  0.20181889  0.27556296
## [433]  1.55961873  1.01747662  4.01715926  1.32386667  0.64295800  0.37747040
## [439]  0.40904251  0.58612514  1.46181247  0.97209670  0.25833993  0.81228290
## [445]  1.13580960  1.16667665  1.01041252  3.85268164  0.70939912  1.70798764
```

```
## [451]   0.34891371   1.22967801   0.36152815   0.74199676   1.46054089   1.40753715
## [457]   0.29550510   1.13465133   1.11178977   0.24843834   2.58293102   2.60919791
## [463]   2.65969381   0.43003381   3.61487448   2.16325650   8.28206898   0.28118864
## [469]   0.67119652   0.74598936   0.70843390   2.26759751   0.86676092   0.85898999
## [475]   4.09754318   9.29453768   1.03291004   1.30399815   0.51284897   5.04127562
## [481]   0.97204478   0.13749807   2.90857522   0.71958632   0.75656375   1.36608812
## [487]   0.28316419   2.58681260   1.50885666   2.84977930   1.01614956   0.26837625
## [493]   1.62897827   0.69581469   1.30518729   1.33602795   4.74250404   0.25448210
## [499]   0.34696876   0.27124551   1.05215031   1.74351326   0.35729007   1.41547994
## [505]   4.15716821   1.22232951   1.50785323   2.68033620   4.33868121   1.20596701
## [511]   1.03098940   1.06851791   0.51575741   1.03201143   0.74855654   0.19517535
## [517]   8.77173743   0.93816050   0.97545663   0.91597731   0.35090505   2.29900430
## [523]   0.47438873   0.43954503   1.48996980   0.26526076   0.43033882   0.07587524
## [529]   0.46810924   1.06746338   7.38722231   2.05097863   1.38970785   0.54570791
## [535]   0.66172537   0.33138411   1.71084728   0.55656290   1.25728659   0.39413618
## [541]   0.77713633   1.46205901   0.99558020   0.90366548   1.58215341   1.00233872
## [547]   0.90139064   0.37742367   1.72138201   0.39542993   0.58217393   1.15183480
```

```r
rlnorm(df$Confirmed,mean.Date(2020-08-31),sdlog = 1)
```

```
##    [1] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##   [19] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##   [37] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##   [55] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##   [73] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##   [91] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [109] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [127] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [145] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [163] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [181] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [199] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [217] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [235] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [253] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [271] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [289] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [307] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [325] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [343] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [361] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [379] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [397] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [415] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [433] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [451] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [469] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [487] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [505] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [523] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [541] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
```

```r
dlnorm(df$Confirmed, meanlog = 1, sdlog = 1, log = FALSE)
```

```
##    [1] 0.000000e+00 0.000000e+00 0.000000e+00 2.419707e-01 2.419707e-01
```

```
##    [6] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [11] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [16] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [21] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [26] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [31] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [36] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 4.859962e-02
##   [41] 2.784847e-02 0.000000e+00 1.902978e-01 1.323358e-01 0.000000e+00
##   [46] 1.902978e-01 1.323358e-01 0.000000e+00 0.000000e+00 2.419707e-01
##   [51] 1.103902e-02 1.103902e-02 6.184516e-03 9.389653e-04 7.437278e-03
##   [56] 2.164812e-02 3.170712e-03 2.946329e-04 4.859962e-02 2.722664e-03
##   [61] 5.963987e-04 3.643514e-02 1.550851e-03 2.349631e-03 2.164812e-02
##   [66] 1.365172e-02 2.784847e-02 9.019006e-03 2.784847e-02 2.164812e-02
##   [71] 1.103902e-02 3.643514e-02 1.707931e-02 1.902978e-01 1.323358e-01
##   [76] 2.784847e-02 2.419707e-01 3.643514e-02 2.419707e-01 9.256496e-02
##   [81] 1.902978e-01 4.859962e-02 3.170712e-03 1.365172e-02 1.707931e-02
##   [86] 1.323358e-01 3.643514e-02 1.365172e-02 9.019006e-03 9.256496e-02
##   [91] 1.707931e-02 1.902978e-01 0.000000e+00 1.902978e-01 0.000000e+00
##   [96] 0.000000e+00 1.323358e-01 0.000000e+00 0.000000e+00 2.419707e-01
##  [101] 1.902978e-01 3.643514e-02 3.643514e-02 6.626564e-02 1.707931e-02
##  [106] 1.198679e-03 5.182008e-03 1.365172e-02 7.437278e-03 8.348328e-04
##  [111] 1.103902e-02 1.550851e-03 1.550851e-03 2.239639e-04 4.842193e-05
##  [116] 9.137419e-05 1.243922e-04 3.505268e-05 2.684477e-04 1.252839e-05
##  [121] 4.842193e-05 6.362289e-05 5.177617e-05 6.826794e-05 1.189320e-05
##  [126] 1.468732e-05 7.970987e-06 3.694092e-06 4.201307e-06 4.388148e-06
##  [131] 9.231719e-06 9.231719e-06 3.979803e-05 1.392236e-05 1.828564e-05
##  [136] 1.252839e-05 8.482372e-05 1.468732e-05 1.729703e-05 2.167632e-05
##  [141] 6.907320e-06 2.764490e-06 1.941572e-06 1.550868e-06 1.293896e-06
##  [146] 1.163532e-06 8.000223e-07 2.265993e-06 8.549939e-07 2.218641e-07
##  [151] 2.764490e-06 2.356701e-06 1.669956e-06 8.269786e-07 6.174714e-07
##  [156] 1.459311e-07 7.264800e-08 1.032606e-07 2.342463e-07 3.630004e-08
##  [161] 2.046617e-08 1.031077e-08 3.064073e-09 1.155259e-09 2.338273e-09
##  [166] 1.927961e-09 2.891402e-10 2.472471e-10 9.468496e-11 5.170889e-11
##  [171] 3.392471e-10 4.030689e-11 5.041863e-11 9.642923e-11 8.127192e-12
##  [176] 6.245720e-12 2.428801e-11 5.320369e-12 1.771280e-11 1.138704e-10
##  [181] 3.578012e-12 2.118202e-11 9.226068e-10 1.571141e-12 4.517897e-12
##  [186] 3.534999e-12 1.374126e-11 6.047062e-12 3.025519e-12 1.678354e-12
##  [191] 2.184792e-12 8.779278e-13 2.753161e-12 3.230277e-12 8.915068e-13
##  [196] 2.737075e-12 4.334651e-13 4.234054e-13 3.533169e-13 5.093954e-13
##  [201] 2.098441e-13 1.821724e-13 2.112635e-14 7.790160e-14 7.353976e-14
##  [206] 3.668954e-14 9.847559e-14 2.300180e-12 1.839347e-14 1.329539e-14
##  [211] 1.662841e-14 1.078779e-14 1.712063e-14 3.911074e-14 5.093954e-13
##  [216] 4.220045e-12 4.697191e-13 4.565502e-13 1.317016e-14 7.687023e-15
##  [221] 2.345762e-15 2.946122e-13 2.717603e-15 1.055653e-15 1.199284e-15
##  [226] 3.007048e-15 3.979122e-15 2.024306e-15 1.088810e-14 1.669160e-15
##  [231] 3.999051e-16 1.384906e-16 1.987174e-16 8.005157e-17 7.286383e-17
##  [236] 3.714636e-15 2.162139e-16 2.301442e-17 5.628837e-18 4.564886e-18
##  [241] 2.284875e-18 1.331524e-18 9.725713e-17 1.485708e-18 2.867083e-19
##  [246] 6.018219e-19 1.862857e-19 8.444804e-19 3.828151e-19 3.984602e-17
##  [251] 8.095371e-19 5.333242e-20 2.062480e-17 1.877623e-19 2.044704e-20
##  [256] 1.706909e-19 9.863459e-18 3.069256e-19 6.291781e-18 8.892311e-19
##  [261] 1.619662e-18 2.371862e-19 1.068252e-18 4.121903e-17 3.916195e-18
##  [266] 4.660160e-19 1.273940e-18 4.002582e-19 5.285788e-19 2.813631e-18
##  [271] 1.567802e-16 2.023784e-17 2.987801e-19 2.244838e-18 3.678894e-18
```

```
## [276] 7.130923e-19 2.230726e-18 2.106228e-16 2.745563e-18 3.981366e-19
## [281] 2.898525e-18 2.296458e-18 1.791139e-18 2.078843e-17 6.760144e-16
## [286] 8.778681e-18 2.281989e-18 1.785384e-17 1.188400e-17 5.378114e-18
## [291] 8.982857e-17 6.538226e-15 1.209905e-17 4.939648e-18 1.344226e-17
## [296] 8.553158e-18 1.246707e-17 2.802322e-17 4.686318e-16 2.145744e-17
## [301] 4.479191e-18 2.294101e-17 2.996837e-16 6.239187e-18 1.515898e-17
## [306] 1.107485e-15 2.305123e-17 5.691539e-18 2.301442e-17 1.352384e-17
## [311] 1.113076e-17 6.304576e-17 1.448090e-15 4.052611e-17 5.307040e-17
## [316] 1.104290e-16 8.034324e-17 9.593063e-18 7.260199e-17 6.595718e-15
## [321] 2.972268e-17 6.835781e-18 4.511681e-17 2.026977e-17 5.876133e-18
## [326] 1.366791e-17 1.004105e-15 8.298080e-18 6.992094e-18 3.179800e-17
## [331] 2.225631e-17 7.866816e-16 5.037540e-17 2.571002e-15 1.050695e-17
## [336] 6.084289e-18 2.986936e-17 4.345154e-17 2.485649e-17 8.674773e-17
## [341] 2.753860e-15 1.582434e-17 5.111526e-18 3.924470e-17 3.369650e-17
## [346] 1.810592e-17 9.600292e-17 2.181289e-15 1.870949e-17 8.855305e-18
## [351] 1.921436e-17 1.560703e-17 9.440258e-18 4.242720e-17 1.208039e-15
## [356] 6.826140e-18 2.917351e-18 5.551527e-18 3.162317e-18 2.422060e-18
## [361] 8.454981e-18 1.164961e-15 5.876133e-18 1.479266e-17 1.248579e-17
## [366] 6.084289e-18 5.966739e-18 2.748078e-17 9.221000e-16 1.356483e-17
## [371] 5.385528e-18 7.690793e-18 1.594651e-17 9.691720e-18 7.993811e-18
## [376] 4.843168e-16 2.991843e-17 9.169254e-18 2.681896e-17 2.225631e-17
## [381] 1.979647e-17 8.486216e-17 3.990127e-15 4.766614e-17 5.152423e-17
## [386] 8.933419e-17 1.034188e-16 7.918355e-17 2.417544e-16 3.188429e-14
## [391] 2.602717e-16 2.246831e-16 5.593382e-16 5.668872e-16 4.341744e-16
## [396] 1.514182e-15 8.751764e-14 3.441329e-15 5.576954e-15 8.637353e-15
## [401] 5.404166e-15 5.178048e-15 4.750995e-14 9.146638e-13 2.235857e-14
## [406] 1.333742e-14 4.216300e-14 1.659939e-13 6.039842e-14 1.578494e-13
## [411] 7.307216e-12 7.730370e-14 4.785749e-14 1.020551e-13 7.325879e-14
## [416] 5.149301e-14 1.123307e-13 2.340148e-12 7.297902e-14 1.416482e-14
## [421] 7.187179e-14 1.376590e-13 5.605921e-14 3.144365e-14 4.652829e-13
## [426] 1.757178e-14 7.732828e-15 5.076138e-15 1.202500e-14 1.085455e-14
## [431] 5.018904e-15 1.951338e-14 8.337238e-16 8.337238e-16 1.379584e-16
## [436] 3.845846e-17 6.749550e-18 2.343441e-18 1.406756e-17 1.224886e-18
## [441] 3.025097e-19 6.078498e-19 8.926869e-20 4.382621e-21 2.996006e-22
## [446] 5.003326e-21 1.506634e-22 3.919469e-23 5.979561e-24 3.498756e-24
## [451] 6.727007e-24 3.471125e-24 4.966162e-23 7.992902e-25 4.069570e-25
## [456] 1.456933e-25 2.155472e-25 3.383255e-25 1.053105e-24 8.727963e-24
## [461] 2.160968e-25 6.035490e-26 5.305352e-26 1.516819e-25 6.007994e-26
## [466] 3.223315e-25 4.972363e-24 2.100747e-25 4.073255e-26 1.013371e-25
## [471] 4.478392e-25 8.353502e-25 2.243466e-24 6.219618e-23 1.290989e-24
## [476] 8.138685e-25 1.713198e-24 2.267722e-24 3.415344e-24 9.406789e-24
## [481] 3.796811e-22 2.167877e-24 3.085035e-24 1.838964e-23 4.091633e-23
## [486] 2.423708e-23 1.285329e-22 1.335733e-20 1.374223e-22 1.444203e-22
## [491] 2.184875e-22 9.447355e-22 4.994627e-22 2.498886e-21 1.764726e-19
## [496] 1.413440e-21 9.589599e-22 2.942465e-21 3.342831e-21 4.391693e-21
## [501] 2.345461e-20 9.641130e-19 1.392229e-20 6.516549e-21 1.174538e-20
## [506] 2.812814e-20 1.197886e-20 2.229360e-20 1.325163e-18 1.050771e-20
## [511] 9.259385e-21 1.585403e-20 2.418682e-20 1.536883e-20 4.120093e-20
## [516] 6.519497e-19 5.343608e-21 4.954706e-21 8.722499e-21 1.564580e-20
## [521] 1.186149e-20 1.558513e-20 6.711646e-19 3.043969e-21 1.384838e-21
## [526] 4.577508e-21 5.295074e-21 3.689056e-21 1.420359e-20 8.800765e-19
## [531] 2.726901e-21 1.353519e-21 4.574341e-21 4.647781e-21 9.916793e-22
## [536] 4.033278e-21 9.789654e-20 6.567582e-22 4.583782e-22 9.049753e-21
## [541] 4.490066e-22 2.588299e-22 4.622381e-22 2.341675e-20 4.455171e-23
```

```
## [546] 4.604887e-23 4.588215e-23 8.374466e-23 8.991208e-23 8.552858e-23
## [551] 3.956854e-21 2.260847e-23
```

```
dlnorm(df$Confirmed, meanlog = 1, sdlog = 1, log = TRUE)
```

```
##    [1]        -Inf        -Inf        -Inf  -1.418939  -1.418939        -Inf
##    [7]        -Inf        -Inf        -Inf        -Inf        -Inf        -Inf
##   [13]        -Inf        -Inf        -Inf        -Inf        -Inf        -Inf
##   [19]        -Inf        -Inf        -Inf        -Inf        -Inf        -Inf
##   [25]        -Inf        -Inf        -Inf        -Inf        -Inf        -Inf
##   [31]        -Inf        -Inf        -Inf        -Inf        -Inf        -Inf
##   [37]        -Inf        -Inf        -Inf  -3.024140  -3.580977        -Inf
##   [43]  -1.659165  -2.022413        -Inf  -1.659165  -2.022413        -Inf
##   [49]        -Inf  -1.418939  -4.506319  -4.506319  -5.085706  -6.970732
##   [55]  -4.901250  -3.832836  -5.753799  -8.129781  -3.024140  -5.906144
##   [61]  -7.424601  -3.312222  -6.468952  -6.053497  -3.832836  -4.293889
##   [67]  -3.580977  -4.708421  -3.580977  -3.832836  -4.506319  -3.312222
##   [73]  -4.069888  -1.659165  -2.022413  -3.580977  -1.418939  -3.312222
##   [79]  -1.418939  -2.379845  -1.659165  -3.024140  -5.753799  -4.293889
##   [85]  -4.069888  -2.022413  -3.312222  -4.293889  -4.708421  -2.379845
##   [91]  -4.069888  -1.659165        -Inf  -1.659165        -Inf        -Inf
##   [97]  -2.022413        -Inf        -Inf  -1.418939  -1.659165  -3.312222
##  [103]  -3.312222  -2.714084  -4.069888  -6.726535  -5.262563  -4.293889
##  [109]  -4.901250  -7.088279  -4.506319  -6.468952  -6.468952  -8.404026
##  [115]  -9.935558  -9.300547  -8.992071 -10.258659  -8.222854 -11.287514
##  [121]  -9.935558  -9.662537  -9.868580  -9.592070 -11.339543 -11.128526
##  [127] -11.739702 -12.508776 -12.380115 -12.336603 -11.592865 -11.592865
##  [133] -10.131693 -11.182015 -10.909394 -11.287514  -9.374935 -11.128526
##  [139] -10.964976 -10.739290 -11.882929 -12.798654 -13.152013 -13.376696
##  [145] -13.557853 -13.664051 -14.038626 -12.997498 -13.972172 -15.321201
##  [151] -12.798654 -12.958248 -13.302713 -14.005487 -14.297633 -15.740131
##  [157] -16.437640 -16.086010 -15.266893 -17.131447 -17.704492 -18.390077
##  [163] -19.603521 -20.578941 -19.873853 -20.066803 -21.964110 -22.120633
##  [169] -23.080466 -23.685391 -21.804292 -23.934499 -23.710660 -23.062212
##  [175] -25.535806 -25.799125 -24.441038 -25.959478 -24.756733 -22.895960
##  [181] -26.356214 -24.577868 -20.803818 -27.179219 -26.122975 -26.368308
##  [187] -25.010618 -25.831449 -26.523938 -27.113207 -26.849500 -27.761212
##  [193] -26.618271 -26.458453 -27.745863 -26.624131 -28.466965 -28.490446
##  [199] -28.671411 -28.305552 -29.192411 -29.333823 -31.488255 -30.183330
##  [205] -30.240950 -30.936285 -29.948968 -26.798034 -31.626781 -31.951359
##  [211] -31.727663 -32.160361 -31.698492 -30.872379 -28.305552 -26.191175
##  [217] -28.386642 -28.415078 -31.960823 -32.499243 -33.686166 -28.853116
##  [223] -33.539026 -34.484616 -34.357052 -33.437818 -33.157715 -33.833549
##  [229] -32.151106 -34.026456 -35.455304 -36.515729 -36.154648 -37.063861
##  [235] -37.157939 -33.226496 -36.070263 -38.310411 -39.718629 -39.928138
##  [241] -40.620220 -41.160207 -36.869173 -41.050640 -42.695821 -41.954325
##  [247] -43.127005 -41.615565 -42.406735 -37.761509 -41.657824 -44.377743
##  [253] -38.420038 -43.119110 -45.336449 -43.214432 -39.157695 -42.627682
##  [259] -39.607287 -41.563930 -40.964314 -42.885441 -41.380508 -37.727632
##  [265] -40.081411 -42.210067 -41.204417 -42.362177 -42.084095 -40.412056
##  [271] -36.391687 -38.438978 -42.654579 -40.637898 -40.143919 -41.784676
##  [277] -40.644205 -36.096463 -40.436545 -42.367492 -40.382330 -40.615164
##  [283] -40.863680 -38.412135 -34.930317 -39.274205 -40.621484 -38.564313
##  [289] -38.971339 -39.764194 -36.948629 -32.661111 -38.953405 -39.849238
##  [295] -38.848128 -39.300231 -38.923441 -38.113498 -35.296714 -38.380460
```

```
## [301] -39.947089 -38.313606 -35.743804 -39.615682 -38.727939 -34.436685
## [307] -38.308813 -39.707551 -38.310411 -38.842078 -39.036819 -37.302671
## [313] -34.168531 -37.744585 -37.474912 -36.742159 -37.060224 -39.185491
## [319] -37.161539 -32.652356 -38.054621 -39.524361 -37.637277 -38.437401
## [325] -39.675633 -38.831481 -34.534679 -39.330508 -39.501752 -37.987128
## [331] -38.343906 -34.778708 -37.527029 -33.594481 -39.094494 -39.640822
## [337] -38.049699 -37.674885 -38.233413 -36.983527 -33.525773 -38.684983
## [343] -39.815034 -37.776715 -37.929138 -38.550293 -36.882153 -33.758861
## [349] -38.517501 -39.265515 -38.490874 -38.698811 -39.201548 -37.698742
## [355] -34.349778 -39.525772 -40.375856 -39.732459 -40.295227 -40.561913
## [361] -39.311776 -34.386088 -39.675633 -38.752400 -38.921940 -39.640822
## [367] -39.660331 -38.133045 -34.619878 -38.839051 -39.762816 -39.406508
## [373] -38.677292 -39.175260 -39.367864 -35.263792 -38.048057 -39.230676
## [379] -38.157423 -38.343906 -38.461028 -37.005503 -33.154953 -37.582310
## [385] -37.504480 -36.954147 -36.807745 -37.074763 -35.958609 -31.076663
## [391] -35.884806 -36.031841 -35.119777 -35.106371 -35.373085 -34.123901
## [397] -30.066936 -33.302919 -32.820134 -32.382680 -32.851606 -32.894348
## [403] -30.677837 -27.720220 -31.431567 -31.948203 -30.797233 -29.426826
## [409] -30.437813 -29.477135 -25.642159 -30.191035 -30.670549 -29.913263
## [415] -30.244778 -30.597330 -29.817329 -26.780807 -30.248604 -31.888015
## [421] -30.263892 -29.613997 -30.512368 -31.090579 -28.396131 -31.672482
## [427] -32.493302 -32.914226 -32.051789 -32.154192 -32.925565 -31.567676
## [433] -34.720630 -34.720630 -36.519580 -37.796953 -39.537056 -40.594911
## [439] -38.802660 -41.243684 -42.642174 -41.944359 -43.862636 -46.876640
## [445] -49.559592 -46.744184 -50.246994 -51.593501 -53.473695 -54.009635
## [451] -53.355912 -54.017563 -51.356810 -55.486073 -56.161090 -57.188294
## [457] -56.796618 -56.345789 -55.210299 -53.095510 -56.794071 -58.069555
## [463] -58.198496 -57.148012 -58.074121 -56.394217 -53.658147 -56.822334
## [469] -58.462770 -57.551345 -56.065363 -55.441946 -54.454020 -51.131749
## [475] -55.006634 -55.467999 -54.723680 -54.443267 -54.033764 -53.020611
## [481] -49.322711 -54.488294 -54.135479 -52.350255 -51.550513 -52.074159
## [487] -50.405857 -45.762222 -50.338984 -50.289314 -49.875313 -48.411137
## [493] -49.048509 -47.438442 -43.181121 -48.008260 -48.396193 -47.275039
## [499] -47.147469 -46.874572 -45.199220 -41.483078 -45.720796 -46.479942
## [505] -45.890827 -45.017516 -45.871143 -45.249987 -41.164996 -46.002178
## [511] -46.128649 -45.590863 -45.168479 -45.621945 -44.635826 -41.874320
## [517] -46.678386 -46.753949 -46.188381 -45.604084 -45.880990 -45.607970
## [523] -41.845272 -47.241125 -48.028704 -46.833132 -46.687510 -47.048916
## [529] -45.700792 -41.574278 -47.351121 -48.051579 -46.833824 -46.817897
## [535] -48.362642 -46.959707 -43.770376 -48.774726 -49.134348 -46.151550
## [541] -49.155005 -49.705871 -49.125962 -45.200835 -51.465392 -51.432339
## [547] -51.435966 -50.834270 -50.763210 -50.813192 -46.978838 -52.143718
```

```
dlnorm(df$Recovered, meanlog = 0, sdlog = 1, log = FALSE)
```

```
##   [1] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [6] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [11] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [16] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [21] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [26] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [31] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [36] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [41] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [46] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
```

```
##    [51] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##    [56] 0.000000e+00 0.000000e+00 7.272826e-02 5.739296e-03 3.815346e-02
##    [61] 0.000000e+00 3.815346e-02 1.568740e-01 1.568740e-01 8.758571e-04
##    [66] 5.739296e-03 1.335454e-02 7.272826e-02 1.516689e-03 1.143833e-03
##    [71] 1.143833e-03 6.468083e-05 2.751379e-04 1.803382e-05 2.751379e-04
##    [76] 1.143833e-03 8.581626e-03 6.468083e-05 2.815902e-03 1.568740e-01
##    [81] 1.143833e-03 1.844708e-04 5.339804e-04 3.989423e-01 5.739296e-03
##    [86] 6.797696e-04 8.581626e-03 3.815346e-02 1.143833e-03 3.815346e-02
##    [91] 2.815902e-03 8.758571e-04 3.965747e-03 5.739296e-03 3.989423e-01
##    [96] 1.399418e-06 0.000000e+00 8.581626e-03 2.185071e-02 2.815902e-03
##   [101] 3.989423e-01 3.815346e-02 0.000000e+00 0.000000e+00 3.989423e-01
##   [106] 7.272826e-02 0.000000e+00 3.815346e-02 0.000000e+00 0.000000e+00
##   [111] 0.000000e+00 2.185071e-02 5.739296e-03 1.568740e-01 7.272826e-02
##   [116] 2.185071e-02 1.516689e-03 2.815902e-03 2.815902e-03 7.272826e-02
##   [121] 2.815902e-03 2.815902e-03 6.797696e-04 3.400443e-04 2.751379e-04
##   [126] 1.065384e-04 1.245558e-05 1.526668e-04 3.790838e-06 9.852165e-06
##   [131] 2.046172e-03 2.339687e-05 1.974646e-06 1.287650e-06 3.072797e-05
##   [136] 5.689846e-06 2.158670e-06 5.499607e-07 1.522569e-06 1.777493e-07
##   [141] 1.890030e-07 1.243801e-07 1.974646e-06 1.483388e-07 2.010831e-07
##   [146] 1.522569e-06 3.155403e-07 2.842464e-06 1.009475e-06 8.860318e-08
##   [151] 8.791764e-06 3.609871e-07 4.765094e-07 2.009856e-08 1.502615e-09
##   [156] 1.550381e-09 1.211338e-09 2.639657e-08 4.900823e-09 4.954304e-08
##   [161] 7.524079e-08 9.782956e-09 5.212854e-08 1.251051e-08 2.009856e-08
##   [166] 5.899766e-09 2.985134e-09 1.816598e-09 6.949501e-10 1.922518e-08
##   [171] 1.412000e-09 4.089747e-09 4.365502e-10 2.096314e-10 2.200318e-10
##   [176] 9.306959e-12 2.242548e-14 1.187115e-14 3.079407e-13 1.703795e-13
##   [181] 3.437679e-13 5.052168e-13 1.088307e-13 5.453441e-14 1.586631e-13
##   [186] 3.113292e-13 8.565129e-14 1.471669e-14 3.217949e-15 9.881102e-14
##   [191] 8.646512e-14 2.106644e-16 2.206386e-14 1.153828e-13 9.844444e-16
##   [196] 4.728747e-14 1.378278e-13 2.053008e-15 9.600869e-14 8.187331e-15
##   [201] 6.504550e-15 1.411424e-15 3.601182e-15 3.601182e-15 1.025284e-15
##   [206] 2.214054e-15 7.559780e-15 3.134492e-15 8.286815e-16 1.536148e-15
##   [211] 4.277182e-17 3.776438e-17 2.258326e-17 1.643998e-16 2.349198e-16
##   [216] 3.565176e-17 3.312462e-17 7.061673e-17 3.900175e-18 3.565176e-17
##   [221] 2.531406e-17 2.080861e-17 1.048159e-16 4.441357e-17 2.815455e-16
##   [226] 1.790375e-15 7.250746e-17 1.082371e-16 3.579826e-17 7.267317e-18
##   [231] 1.948429e-17 3.641475e-18 3.559482e-18 2.443131e-18 3.479515e-18
##   [236] 1.480691e-18 1.567170e-18 1.856045e-18 9.782790e-19 4.147394e-19
##   [241] 8.956188e-19 5.269587e-19 5.936346e-19 4.875277e-19 3.592461e-19
##   [246] 2.719045e-18 9.313673e-20 4.022013e-20 1.880893e-20 2.865225e-20
##   [251] 1.463026e-20 1.892436e-21 5.399736e-22 1.358147e-22 2.499610e-22
##   [256] 4.810817e-23 1.772754e-22 2.048684e-22 1.875057e-22 4.834350e-22
##   [261] 7.565273e-22 1.458086e-22 8.741310e-23 2.856079e-22 3.238110e-22
##   [266] 6.818114e-22 2.425407e-22 2.025791e-21 1.177895e-21 2.254591e-22
##   [271] 4.669148e-22 5.309394e-22 2.222605e-22 8.100596e-23 1.790892e-22
##   [276] 3.440437e-22 7.753662e-23 4.662669e-22 5.527600e-23 1.118116e-22
##   [281] 2.113125e-22 1.732670e-22 4.585685e-22 6.682403e-22 2.515753e-21
##   [286] 8.365851e-22 3.824589e-22 2.022575e-21 1.776958e-21 7.285631e-22
##   [291] 8.539317e-22 1.015250e-21 9.383894e-22 4.943421e-22 6.615656e-22
##   [296] 1.310006e-21 8.112822e-22 1.706035e-21 6.469670e-21 1.066498e-20
##   [301] 3.573052e-21 2.569373e-21 3.489781e-20 8.464443e-21 3.071388e-21
##   [306] 2.240068e-21 1.922570e-21 2.769368e-21 4.850509e-21 5.710069e-21
##   [311] 3.287183e-21 9.408641e-21 2.512283e-20 2.365685e-20 2.824726e-20
##   [316] 1.895670e-20 2.305089e-20 8.572696e-21 8.729978e-21 3.979994e-20
```

```
## [321] 1.245316e-20 3.834232e-21 1.494120e-20 2.532570e-20 2.300499e-20
## [326] 4.064520e-20 3.872974e-20 1.266597e-20 2.046591e-20 2.075047e-20
## [331] 3.776979e-20 1.934367e-19 4.348930e-19 7.774952e-20 1.335390e-20
## [336] 3.972587e-21 7.058104e-21 1.144615e-20 1.451896e-20 2.706942e-20
## [341] 1.074440e-20 1.638523e-20 1.146754e-20 4.459387e-21 7.747253e-21
## [346] 6.481129e-21 2.756749e-20 1.381720e-19 6.258048e-20 1.048863e-20
## [351] 5.408819e-20 3.090127e-20 1.381767e-20 4.644421e-20 1.384992e-19
## [356] 5.912292e-20 3.286340e-22 1.700709e-21 2.058253e-21 8.342552e-21
## [361] 1.020176e-20 4.718822e-21 8.237471e-21 1.394960e-20 4.817215e-21
## [366] 1.310006e-21 5.184219e-22 3.821332e-21 9.443192e-21 3.713582e-21
## [371] 1.346537e-21 1.429561e-21 8.937559e-22 1.842386e-21 2.662981e-21
## [376] 2.615720e-21 1.165506e-21 3.726084e-21 4.074751e-21 7.636603e-21
## [381] 3.206370e-21 2.578873e-20 1.229034e-20 6.311559e-21 1.952225e-20
## [386] 9.832539e-21 1.869893e-20 3.174655e-21 5.316164e-20 1.315327e-20
## [391] 1.987042e-20 2.952287e-21 2.796182e-20 8.316639e-20 2.807561e-20
## [396] 5.455808e-20 4.213410e-19 3.823902e-19 1.071134e-19 8.058873e-20
## [401] 2.766646e-19 3.774368e-19 1.051559e-19 1.463161e-18 4.867801e-20
## [406] 7.435357e-20 2.076865e-19 5.472364e-19 7.629263e-19 8.023361e-19
## [411] 4.348930e-19 2.281071e-18 2.833449e-18 3.450327e-17 6.612349e-17
## [416] 2.385875e-17 2.040909e-17 1.643998e-16 2.785029e-17 4.404282e-17
## [421] 1.033864e-16 8.173552e-17 3.985020e-17 1.092371e-16 8.940651e-17
## [426] 7.187108e-17 4.811249e-17 1.187103e-16 1.777004e-17 2.772930e-16
## [431] 2.773919e-17 1.029147e-16 8.900464e-17 6.908263e-17 2.442951e-17
## [436] 8.884723e-18 6.071085e-18 1.359895e-17 8.916425e-18 1.811411e-18
## [441] 4.986252e-18 4.110850e-18 1.887744e-19 2.657157e-19 3.341391e-20
## [446] 5.797528e-20 1.526724e-19 6.401384e-21 1.367311e-21 4.280507e-21
## [451] 4.936526e-22 1.239383e-22 1.548476e-22 2.467697e-26 1.561994e-25
## [456] 5.552889e-27 4.272914e-26 1.574925e-25 9.183891e-26 1.310477e-26
## [461] 5.217015e-28 2.061411e-27 3.422238e-28 4.196555e-28 3.020521e-28
## [466] 1.443444e-28 7.115223e-29 3.800106e-29 2.195380e-29 2.934807e-29
## [471] 6.836676e-29 1.376288e-28 2.428749e-29 6.880066e-35 8.236620e-31
## [476] 4.429747e-31 1.233860e-30 3.070752e-30 9.428154e-31 9.213816e-30
## [481] 1.375607e-29 3.290285e-29 1.622356e-29 9.100096e-29 4.952597e-28
## [486] 2.328021e-28 1.624178e-28 1.719225e-28 1.283195e-27 1.243343e-28
## [491] 4.363879e-28 5.903777e-28 1.352415e-27 4.725513e-27 3.682690e-27
## [496] 9.949126e-27 8.840314e-27 3.164832e-26 1.732280e-25 2.845568e-26
## [501] 3.439067e-26 6.872806e-26 6.572985e-25 1.377493e-25 6.187583e-25
## [506] 2.039658e-24 8.941396e-25 1.566091e-24 6.274291e-25 2.931867e-24
## [511] 5.867060e-25 3.701466e-24 5.406177e-24 5.074872e-24 1.714896e-24
## [516] 3.506871e-24 1.138446e-23 2.737075e-24 3.398515e-24 1.184784e-23
## [521] 1.494508e-24 3.438330e-24 4.138120e-24 7.210860e-24 3.206813e-24
## [526] 3.890191e-24 9.614361e-24 2.599084e-24 1.510803e-24 3.775734e-24
## [531] 1.085427e-23 1.025620e-24 1.687642e-24 7.593965e-24 8.578793e-25
## [536] 4.764798e-25 8.517672e-25 2.213214e-24 4.177814e-25 7.006448e-25
## [541] 5.351026e-24 1.559850e-25 1.867329e-25 2.364275e-25 7.223418e-25
## [546] 3.642777e-26 7.300506e-26 2.850977e-25 6.357753e-26 3.574901e-26
## [551] 1.176244e-25 1.437855e-25
```

```r
dlnorm(df$Deceased, meanlog = 0, sdlog = 1, log = FALSE)
```

```
##    [1] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##    [6] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [11] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [16] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##   [21] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
```

```
##  [26] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [31] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [36] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [41] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [46] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [51] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [56] 0.000000e+00 0.000000e+00 0.000000e+00 3.989423e-01 0.000000e+00
##  [61] 0.000000e+00 3.989423e-01 0.000000e+00 0.000000e+00 0.000000e+00
##  [66] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [71] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [76] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [81] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [86] 3.989423e-01 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [91] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
##  [96] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [101] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [106] 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [111] 0.000000e+00 0.000000e+00 0.000000e+00 3.989423e-01 0.000000e+00
## [116] 3.989423e-01 3.989423e-01 0.000000e+00 0.000000e+00 3.989423e-01
## [121] 3.989423e-01 3.989423e-01 3.989423e-01 0.000000e+00 3.989423e-01
## [126] 0.000000e+00 7.272826e-02 0.000000e+00 3.989423e-01 0.000000e+00
## [131] 3.989423e-01 0.000000e+00 3.989423e-01 3.989423e-01 3.989423e-01
## [136] 0.000000e+00 0.000000e+00 3.989423e-01 0.000000e+00 0.000000e+00
## [141] 3.989423e-01 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [146] 3.989423e-01 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
## [151] 0.000000e+00 3.989423e-01 3.989423e-01 3.989423e-01 0.000000e+00
## [156] 0.000000e+00 0.000000e+00 0.000000e+00 1.568740e-01 0.000000e+00
## [161] 0.000000e+00 0.000000e+00 0.000000e+00 1.568740e-01 1.568740e-01
## [166] 1.568740e-01 3.989423e-01 3.989423e-01 1.568740e-01 3.989423e-01
## [171] 1.568740e-01 1.568740e-01 3.989423e-01 3.989423e-01 3.989423e-01
## [176] 2.185071e-02 3.815346e-02 2.185071e-02 1.568740e-01 1.568740e-01
## [181] 3.815346e-02 3.989423e-01 1.568740e-01 7.272826e-02 5.739296e-03
## [186] 3.989423e-01 1.568740e-01 7.272826e-02 8.581626e-03 7.272826e-02
## [191] 2.185071e-02 3.815346e-02 1.568740e-01 8.581626e-03 2.185071e-02
## [196] 1.335454e-02 7.272826e-02 2.815902e-03 8.581626e-03 2.815902e-03
## [201] 1.143833e-03 1.335454e-02 8.581626e-03 3.965747e-03 1.516689e-03
## [206] 6.797696e-04 2.185071e-02 2.046172e-03 2.815902e-03 1.143833e-03
## [211] 2.815902e-03 8.581626e-03 1.335454e-02 8.581626e-03 8.581626e-03
## [216] 3.815346e-02 8.581626e-03 2.815902e-03 2.046172e-03 2.046172e-03
## [221] 2.815902e-03 1.516689e-03 1.143833e-03 1.516689e-03 1.516689e-03
## [226] 8.758571e-04 6.797696e-04 8.758571e-04 6.797696e-04 1.516689e-03
## [231] 8.758571e-04 3.965747e-03 1.516689e-03 3.400443e-04 5.339804e-04
## [236] 3.400443e-04 2.751379e-04 2.244457e-04 1.844708e-04 1.526668e-04
## [241] 1.844708e-04 1.844708e-04 2.244457e-04 1.526668e-04 1.271561e-04
## [246] 4.746229e-05 2.244457e-04 1.526668e-04 1.271561e-04 1.271561e-04
## [251] 8.975784e-05 1.526668e-04 1.065384e-04 8.975784e-05 1.271561e-04
## [256] 8.975784e-05 1.526668e-04 1.844708e-04 2.244457e-04 1.271561e-04
## [261] 1.065384e-04 7.601107e-05 1.526668e-04 1.844708e-04 1.065384e-04
## [266] 7.601107e-05 1.271561e-04 7.601107e-05 8.975784e-05 7.601107e-05
## [271] 2.244457e-04 1.065384e-04 6.468083e-05 7.601107e-05 5.528901e-05
## [276] 6.468083e-05 5.528901e-05 1.844708e-04 7.601107e-05 5.528901e-05
## [281] 7.601107e-05 6.468083e-05 5.528901e-05 1.065384e-04 1.526668e-04
## [286] 5.528901e-05 4.746229e-05 8.975784e-05 7.601107e-05 7.601107e-05
## [291] 1.844708e-04 2.751379e-04 6.468083e-05 5.528901e-05 7.601107e-05
```

```
## [296] 5.528901e-05 8.975784e-05 6.468083e-05 1.526668e-04 1.065384e-04
## [301] 7.601107e-05 6.468083e-05 1.271561e-04 8.975784e-05 6.468083e-05
## [306] 1.844708e-04 7.601107e-05 5.528901e-05 3.539076e-05 4.746229e-05
## [311] 3.072797e-05 5.528901e-05 1.271561e-04 3.539076e-05 2.051126e-05
## [316] 7.601107e-05 4.746229e-05 3.072797e-05 4.746229e-05 1.065384e-04
## [321] 2.677000e-05 6.468083e-05 6.468083e-05 1.271561e-04 4.746229e-05
## [326] 4.090707e-05 6.468083e-05 6.468083e-05 1.526668e-04 1.526668e-04
## [331] 5.339804e-04 1.844708e-04 8.975784e-05 8.758571e-04 1.065384e-04
## [336] 5.528901e-05 4.090707e-05 1.271561e-04 1.844708e-04 8.975784e-05
## [341] 2.751379e-04 1.065384e-04 8.975784e-05 8.975784e-05 1.271561e-04
## [346] 1.526668e-04 1.271561e-04 2.244457e-04 8.975784e-05 7.601107e-05
## [351] 2.751379e-04 1.271561e-04 6.468083e-05 1.844708e-04 4.240324e-04
## [356] 7.601107e-05 3.400443e-04 1.844708e-04 2.751379e-04 1.271561e-04
## [361] 2.244457e-04 4.240324e-04 2.751379e-04 2.244457e-04 2.751379e-04
## [366] 1.526668e-04 3.400443e-04 1.844708e-04 4.240324e-04 5.339804e-04
## [371] 2.244457e-04 4.240324e-04 2.751379e-04 5.339804e-04 2.751379e-04
## [376] 5.339804e-04 2.751379e-04 3.400443e-04 5.339804e-04 3.400443e-04
## [381] 5.339804e-04 6.797696e-04 1.143833e-03 3.400443e-04 5.339804e-04
## [386] 8.758571e-04 6.797696e-04 1.143833e-03 6.797696e-04 5.339804e-04
## [391] 8.758571e-04 4.240324e-04 8.758571e-04 8.758571e-04 3.400443e-04
## [396] 6.797696e-04 1.143833e-03 5.339804e-04 6.797696e-04 8.758571e-04
## [401] 5.339804e-04 5.339804e-04 1.143833e-03 1.516689e-03 5.339804e-04
## [406] 8.758571e-04 1.143833e-03 8.758571e-04 1.516689e-03 6.797696e-04
## [411] 2.046172e-03 6.797696e-04 1.143833e-03 6.797696e-04 4.240324e-04
## [416] 6.797696e-04 1.143833e-03 1.516689e-03 2.815902e-03 2.815902e-03
## [421] 1.516689e-03 8.758571e-04 8.758571e-04 1.516689e-03 2.046172e-03
## [426] 5.339804e-04 6.797696e-04 2.046172e-03 8.758571e-04 1.516689e-03
## [431] 2.815902e-03 1.516689e-03 8.758571e-04 5.339804e-04 3.400443e-04
## [436] 1.526668e-04 4.240324e-04 5.339804e-04 2.046172e-03 2.244457e-04
## [441] 1.526668e-04 2.244457e-04 1.844708e-04 6.468083e-05 8.975784e-05
## [446] 1.844708e-04 5.528901e-05 1.526668e-04 5.528901e-05 6.468083e-05
## [451] 8.975784e-05 4.090707e-05 5.528901e-05 3.072797e-05 9.852165e-06
## [456] 4.628683e-06 4.185470e-06 4.628683e-06 4.185470e-06 6.325379e-06
## [461] 1.974646e-06 1.808559e-06 1.186081e-06 2.589827e-06 1.093665e-06
## [466] 7.984697e-07 1.009475e-06 3.609871e-07 1.318353e-07 1.174046e-07
## [471] 1.483388e-07 1.243801e-07 1.890030e-07 2.140590e-07 1.174046e-07
## [476] 5.212854e-08 2.407558e-08 1.304480e-08 3.549799e-09 2.357786e-09
## [481] 1.816598e-09 3.427786e-09 9.029518e-09 2.985134e-09 1.937318e-09
## [486] 1.704337e-09 2.520271e-09 3.808922e-09 1.937318e-09 1.073912e-09
## [491] 8.341446e-09 1.760516e-08 1.211338e-09 7.148632e-10 1.140283e-09
## [496] 2.897660e-08 7.418289e-09 1.937318e-09 3.946498e-09 4.238933e-09
## [501] 1.327528e-09 6.126280e-09 5.084161e-09 1.060882e-08 2.010831e-07
## [506] 1.777493e-07 4.479985e-08 5.212854e-08 1.398078e-07 1.360524e-08
## [511] 9.397644e-09 1.685392e-08 3.862604e-08 3.862604e-08 1.287650e-06
## [516] 5.777690e-08 7.942022e-08 1.304480e-08 2.897660e-08 1.105136e-08
## [521] 1.760516e-08 4.440638e-07 8.860318e-08 1.304480e-08 1.018636e-08
## [526] 1.304480e-08 2.198471e-08 6.086187e-08 1.174046e-07 9.902387e-08
## [531] 2.897660e-08 2.407558e-08 2.140590e-07 2.198471e-08 4.710320e-08
## [536] 3.155403e-07 1.808559e-06 7.942022e-08 7.524079e-08 3.184872e-08
## [541] 2.009856e-08 1.108742e-07 9.326865e-07 1.760516e-08 7.418289e-09
## [546] 2.101750e-08 2.407558e-08 4.262442e-08 3.373841e-07 2.158670e-06
## [551] 3.862604e-08 1.018636e-08
```

```
plnorm(df$Confirmed, meanlog = 0, sdlog = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.5000000 0.5000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.9634142 0.9812116 0.0000000
##  [43] 0.7558914 0.8640314 0.0000000 0.7558914 0.8640314 0.0000000 0.0000000
##  [50] 0.5000000 0.9935207 0.9935207 0.9966160 0.9995692 0.9958432 0.9859978
##  [57] 0.9983823 0.9998756 0.9634142 0.9986311 0.9997356 0.9741672 0.9992587
##  [64] 0.9988347 0.9859978 0.9917552 0.9812116 0.9948405 0.9812116 0.9859978
##  [71] 0.9935207 0.9741672 0.9893489 0.7558914 0.8640314 0.9812116 0.5000000
##  [78] 0.9741672 0.5000000 0.9171715 0.7558914 0.9634142 0.9983823 0.9917552
##  [85] 0.9893489 0.8640314 0.9741672 0.9917552 0.9948405 0.9171715 0.9893489
##  [92] 0.7558914 0.0000000 0.7558914 0.0000000 0.0000000 0.8640314 0.0000000
##  [99] 0.0000000 0.5000000 0.7558914 0.9741672 0.9741672 0.9462397 0.9893489
## [106] 0.9994392 0.9972194 0.9917552 0.9958432 0.9996205 0.9935207 0.9992587
## [113] 0.9992587 0.9999071 0.9999816 0.9999641 0.9999503 0.9999869 0.9998874
## [120] 0.9999956 0.9999816 0.9999755 0.9999803 0.9999736 0.9999958 0.9999948
## [127] 0.9999972 0.9999988 0.9999986 0.9999985 0.9999968 0.9999968 0.9999851
## [134] 0.9999950 0.9999934 0.9999956 0.9999668 0.9999948 0.9999938 0.9999921
## [141] 0.9999976 0.9999991 0.9999994 0.9999995 0.9999996 0.9999996 0.9999997
## [148] 0.9999993 0.9999997 0.9999999 0.9999991 0.9999992 0.9999995 0.9999997
## [155] 0.9999998 1.0000000 1.0000000 1.0000000 0.9999999 1.0000000 1.0000000
## [162] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [169] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [274] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [281] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [302] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
plnorm(df$Recovered, meanlog = 0, sdlog = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.8640314 0.9812116 0.9171715 0.0000000 0.9171715 0.7558914
##  [64] 0.7558914 0.9958432 0.9812116 0.9634142 0.8640314 0.9935207 0.9948405
##  [71] 0.9948405 0.9995094 0.9983823 0.9998305 0.9983823 0.9948405 0.9741672
##  [78] 0.9995094 0.9893489 0.7558914 0.9948405 0.9988347 0.9972194 0.5000000
##  [85] 0.9812116 0.9966160 0.9741672 0.9171715 0.9948405 0.9171715 0.9893489
##  [92] 0.9958432 0.9859978 0.9812116 0.5000000 0.9999803 0.0000000 0.9741672
##  [99] 0.9462397 0.9893489 0.5000000 0.9171715 0.0000000 0.0000000 0.5000000
## [106] 0.8640314 0.0000000 0.9171715 0.0000000 0.0000000 0.0000000 0.9462397
## [113] 0.9812116 0.7558914 0.8640314 0.9462397 0.9935207 0.9893489 0.9893489
## [120] 0.8640314 0.9893489 0.9893489 0.9966160 0.9980761 0.9983823 0.9992587
## [127] 0.9998756 0.9990027 0.9999542 0.9998978 0.9917552 0.9997893 0.9999736
## [134] 0.9999816 0.9997356 0.9999356 0.9999716 0.9999911 0.9999788 0.9999966
## [141] 0.9999964 0.9999975 0.9999736 0.9999971 0.9999962 0.9999788 0.9999944
## [148] 0.9999641 0.9999851 0.9999981 0.9999071 0.9999938 0.9999921 0.9999995
## [155] 0.9999999 0.9999999 1.0000000 0.9999993 0.9999998 0.9999989 0.9999984
## [162] 0.9999997 0.9999988 0.9999997 0.9999995 0.9999998 0.9999999 0.9999999
## [169] 1.0000000 0.9999995 0.9999999 0.9999999 1.0000000 1.0000000 1.0000000
```

```
## [176] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [183] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [190] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [197] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [204] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [211] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [218] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [225] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [232] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [239] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [246] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [253] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [260] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [267] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
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## [288] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [295] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
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## [309] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [316] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [323] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [330] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [337] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [344] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [351] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [358] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [365] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [372] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [379] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [386] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [393] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [400] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [407] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [414] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [421] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [428] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [435] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [442] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [449] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [456] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [463] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [470] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [477] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [484] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [491] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [498] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [505] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [512] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [519] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [526] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [533] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [540] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## [547] 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
plnorm(df$Deceased, meanlog = 0, sdlog = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##   [8] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [15] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [22] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [29] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [36] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [43] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [50] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [57] 0.0000000 0.0000000 0.5000000 0.0000000 0.0000000 0.5000000 0.0000000
##  [64] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [71] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [78] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [85] 0.0000000 0.5000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [92] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
##  [99] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [106] 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## [113] 0.0000000 0.5000000 0.0000000 0.5000000 0.5000000 0.0000000 0.0000000
## [120] 0.5000000 0.5000000 0.5000000 0.5000000 0.0000000 0.5000000 0.0000000
## [127] 0.8640314 0.0000000 0.5000000 0.0000000 0.5000000 0.0000000 0.5000000
## [134] 0.5000000 0.5000000 0.0000000 0.0000000 0.5000000 0.0000000 0.0000000
## [141] 0.5000000 0.0000000 0.0000000 0.0000000 0.0000000 0.5000000 0.0000000
## [148] 0.0000000 0.0000000 0.0000000 0.0000000 0.5000000 0.5000000 0.5000000
## [155] 0.0000000 0.0000000 0.0000000 0.0000000 0.7558914 0.0000000 0.0000000
## [162] 0.0000000 0.0000000 0.7558914 0.7558914 0.7558914 0.5000000 0.5000000
## [169] 0.7558914 0.5000000 0.7558914 0.7558914 0.5000000 0.5000000 0.5000000
## [176] 0.9462397 0.9171715 0.9462397 0.7558914 0.7558914 0.9171715 0.5000000
## [183] 0.7558914 0.8640314 0.9812116 0.5000000 0.7558914 0.8640314 0.9741672
## [190] 0.8640314 0.9462397 0.9171715 0.7558914 0.9741672 0.9462397 0.9634142
## [197] 0.8640314 0.9893489 0.9741672 0.9893489 0.9948405 0.9634142 0.9741672
## [204] 0.9859978 0.9935207 0.9966160 0.9462397 0.9917552 0.9893489 0.9948405
## [211] 0.9893489 0.9741672 0.9634142 0.9741672 0.9741672 0.9171715 0.9741672
## [218] 0.9893489 0.9917552 0.9917552 0.9893489 0.9935207 0.9948405 0.9935207
## [225] 0.9935207 0.9958432 0.9966160 0.9958432 0.9966160 0.9935207 0.9958432
## [232] 0.9859978 0.9935207 0.9980761 0.9972194 0.9980761 0.9983823 0.9986311
## [239] 0.9988347 0.9990027 0.9988347 0.9988347 0.9986311 0.9990027 0.9991422
## [246] 0.9996205 0.9986311 0.9990027 0.9991422 0.9991422 0.9993565 0.9990027
## [253] 0.9992587 0.9993565 0.9991422 0.9993565 0.9990027 0.9988347 0.9986311
## [260] 0.9991422 0.9992587 0.9994392 0.9990027 0.9988347 0.9992587 0.9994392
## [267] 0.9991422 0.9994392 0.9993565 0.9994392 0.9986311 0.9992587 0.9995094
## [274] 0.9994392 0.9995692 0.9995094 0.9995692 0.9988347 0.9994392 0.9995692
## [281] 0.9994392 0.9995094 0.9995692 0.9992587 0.9990027 0.9995692 0.9996205
## [288] 0.9993565 0.9994392 0.9994392 0.9988347 0.9983823 0.9995094 0.9995692
## [295] 0.9994392 0.9995692 0.9993565 0.9995094 0.9990027 0.9992587 0.9994392
## [302] 0.9995094 0.9991422 0.9993565 0.9995094 0.9988347 0.9994392 0.9995692
## [309] 0.9997026 0.9996205 0.9997356 0.9995692 0.9991422 0.9997026 0.9998113
## [316] 0.9994392 0.9996205 0.9997356 0.9996205 0.9992587 0.9997643 0.9995094
## [323] 0.9995094 0.9991422 0.9996205 0.9996645 0.9995094 0.9995094 0.9990027
## [330] 0.9990027 0.9972194 0.9988347 0.9993565 0.9958432 0.9992587 0.9995692
## [337] 0.9996645 0.9991422 0.9988347 0.9993565 0.9983823 0.9992587 0.9993565
## [344] 0.9993565 0.9991422 0.9990027 0.9991422 0.9986311 0.9993565 0.9994392
## [351] 0.9983823 0.9991422 0.9995094 0.9988347 0.9976959 0.9994392 0.9980761
## [358] 0.9988347 0.9983823 0.9991422 0.9986311 0.9976959 0.9983823 0.9986311
```

```
## [365] 0.9983823 0.9990027 0.9980761 0.9988347 0.9976959 0.9972194 0.9986311
## [372] 0.9976959 0.9983823 0.9972194 0.9983823 0.9972194 0.9983823 0.9980761
## [379] 0.9972194 0.9980761 0.9972194 0.9966160 0.9948405 0.9980761 0.9972194
## [386] 0.9958432 0.9966160 0.9948405 0.9966160 0.9972194 0.9958432 0.9976959
## [393] 0.9958432 0.9958432 0.9980761 0.9966160 0.9948405 0.9972194 0.9966160
## [400] 0.9958432 0.9972194 0.9972194 0.9948405 0.9935207 0.9972194 0.9958432
## [407] 0.9948405 0.9958432 0.9935207 0.9966160 0.9917552 0.9966160 0.9948405
## [414] 0.9966160 0.9976959 0.9966160 0.9948405 0.9935207 0.9893489 0.9893489
## [421] 0.9935207 0.9958432 0.9958432 0.9935207 0.9917552 0.9972194 0.9966160
## [428] 0.9917552 0.9958432 0.9935207 0.9893489 0.9935207 0.9958432 0.9972194
## [435] 0.9980761 0.9990027 0.9976959 0.9972194 0.9917552 0.9986311 0.9990027
## [442] 0.9986311 0.9988347 0.9995094 0.9993565 0.9988347 0.9995692 0.9990027
## [449] 0.9995692 0.9995094 0.9993565 0.9996645 0.9995692 0.9997356 0.9998978
## [456] 0.9999458 0.9999503 0.9999458 0.9999503 0.9999296 0.9999736 0.9999755
## [463] 0.9999829 0.9999668 0.9999840 0.9999878 0.9999851 0.9999938 0.9999974
## [470] 0.9999976 0.9999971 0.9999975 0.9999964 0.9999960 0.9999976 0.9999988
## [477] 0.9999994 0.9999996 0.9999999 0.9999999 0.9999999 0.9999999 0.9999997
## [484] 0.9999999 0.9999999 0.9999999 0.9999999 0.9999999 0.9999999 1.0000000
## [491] 0.9999998 0.9999995 1.0000000 1.0000000 1.0000000 0.9999993 0.9999998
## [498] 0.9999999 0.9999999 0.9999999 1.0000000 0.9999998 0.9999998 0.9999997
## [505] 0.9999962 0.9999966 0.9999990 0.9999988 0.9999972 0.9999996 0.9999997
## [512] 0.9999996 0.9999991 0.9999991 0.9999816 0.9999987 0.9999983 0.9999996
## [519] 0.9999993 0.9999997 0.9999995 0.9999926 0.9999981 0.9999996 0.9999997
## [526] 0.9999996 0.9999994 0.9999986 0.9999976 0.9999979 0.9999993 0.9999994
## [533] 0.9999960 0.9999994 0.9999989 0.9999944 0.9999755 0.9999983 0.9999984
## [540] 0.9999992 0.9999995 0.9999977 0.9999860 0.9999995 0.9999998 0.9999995
## [547] 0.9999994 0.9999990 0.9999941 0.9999716 0.9999991 0.9999997
```

```
qlnorm(df$Confirmed, meanlog = 0, sdlog = 1, lower.tail = TRUE, log.p = TRUE)
```

```
## Warning in qlnorm(df$Confirmed, meanlog = 0, sdlog = 1, lower.tail = TRUE, :
## NaNs produced
```

```
##   [1] Inf Inf Inf NaN NaN Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [19] Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf
##  [37] Inf Inf Inf NaN NaN Inf NaN NaN Inf NaN NaN Inf Inf NaN NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN Inf NaN Inf Inf NaN Inf Inf NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
qlnorm(df$Recovered, meanlog = 0, sdlog = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qlnorm(df$Recovered, meanlog = 0, sdlog = 1, lower.tail = TRUE, :
## NaNs produced
```

```
##   [1]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [55]   0   0   0 NaN NaN NaN   0 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN Inf NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN NaN NaN Inf NaN   0 NaN NaN NaN Inf NaN   0   0 Inf NaN   0 NaN
## [109]   0   0   0 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
qlnorm(df$Deceased, meanlog = 0, sdlog = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qlnorm(df$Deceased, meanlog = 0, sdlog = 1, lower.tail = TRUE, : NaNs
## produced
```

```
##  [1]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## [37]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## [55]   0   0   0   0 Inf   0   0 Inf   0   0   0   0   0   0   0   0   0   0
```

```
## [73]    0    0    0    0    0    0    0    0    0    0    0    0    0  Inf    0    0    0    0
## [91]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
## [109]   0    0    0    0    0  Inf    0  Inf  Inf    0    0  Inf  Inf  Inf  Inf    0  Inf    0
## [127] NaN    0  Inf    0  Inf    0  Inf  Inf  Inf    0    0  Inf    0    0  Inf    0    0    0
## [145]   0  Inf    0    0    0    0    0  Inf  Inf  Inf    0    0    0    0  NaN    0    0    0
## [163]   0  NaN  NaN  NaN  Inf  Inf  NaN  Inf  NaN  NaN  Inf  Inf  Inf  NaN  NaN  NaN  NaN  NaN
## [181] NaN  Inf  NaN  NaN  NaN  Inf  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [199] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [217] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [235] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [253] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [271] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [289] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [307] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [325] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [343] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [361] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [379] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [397] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [415] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [433] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [451] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [469] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [487] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [505] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [523] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
## [541] NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN  NaN
```

```
rnbinom(df$Confirmed, size=1, prob=.5)
```

```
##   [1] 0 0 2 0 1 0 0 0 2 0 0 0 4 0 5 1 1 2 0 3 0 5 0 0 2 5 1 0 0 6 0 4 0 0 1 2 2
##  [38] 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 1 0 4 1 0 0 0 0 1 0 2 2 1 0 0 0 0 0 0 0 0
##  [75] 0 0 2 4 1 1 0 1 6 0 0 4 0 0 2 0 2 3 4 0 0 0 0 0 3 0 0 3 1 1 0 6 0 2 1 1
## [112] 0 4 0 0 0 2 1 0 2 0 0 3 1 1 4 0 0 1 3 1 0 1 0 1 2 0 0 1 1 0 2 2 1 1 0 2 0
## [149] 5 0 1 0 3 0 1 2 2 0 1 1 1 2 0 0 0 0 2 1 2 2 7 1 0 0 0 0 2 1 1 0 1 2 2 1 2
## [186] 1 0 1 0 2 1 0 3 0 4 0 2 0 3 5 2 2 2 2 0 0 1 0 2 0 1 3 0 0 2 2 0 3 0 0 0 0
## [223] 0 0 1 0 1 0 0 0 0 0 0 0 1 0 0 0 5 2 0 0 3 0 0 3 1 0 2 2 2 0 0 0 1 2 0 5 3
## [260] 0 1 0 0 1 2 0 3 1 0 1 0 0 0 0 0 3 1 0 1 0 0 0 0 2 0 0 0 0 0 2 8 0 0 2 1 0
## [297] 1 1 0 0 2 2 1 2 1 2 0 1 0 0 0 2 0 0 0 0 0 2 1 1 0 1 0 0 1 0 4 1 1 0 1 1 0
## [334] 1 1 0 0 1 0 1 1 0 1 5 0 1 0 0 0 2 0 0 1 3 0 4 1 0 1 6 0 1 0 0 0 0 1 0 3 3
## [371] 2 2 1 0 0 1 6 0 0 0 2 0 1 2 0 2 1 4 1 0 5 1 1 0 0 1 0 0 0 1 1 0 0 2 1 1 3
## [408] 5 0 0 2 3 3 1 1 1 0 0 0 1 1 0 0 1 0 0 0 0 0 5 2 3 0 1 0 0 0 2 1 1 0 3 3
## [445] 0 0 0 1 0 0 0 0 2 3 0 4 3 0 0 4 0 5 0 0 0 1 0 0 0 1 0 2 2 0 1 1 2 0 0 0 2
## [482] 0 1 1 1 1 0 1 3 0 0 1 1 1 0 0 0 0 1 0 2 1 1 2 2 0 0 0 1 4 4 0 0 5 0 0 0 2
## [519] 0 3 0 3 1 1 0 1 0 3 0 0 0 0 5 0 1 2 0 1 1 1 0 0 1 0 2 3 1 2 2 2 0 1
```

```
rnbinom(df$Recovered,size = 1,prob = 0.5)
```

```
##   [1] 0 4 1 0 0 0 0 0 0 3 0 2 0 3 0 0 1 2 0 0 3 0 2 2 0 0 0 1 1 0 2 3 0 0 0 1 0
##  [38] 0 3 0 0 1 5 6 0 0 4 1 0 1 2 1 0 2 1 0 0 0 0 0 1 0 2 1 0 1 0 1 0 4 1 0 3 3
##  [75] 3 3 3 1 1 0 0 0 0 1 0 3 0 0 2 1 0 0 2 0 0 0 0 0 0 1 3 0 1 0 0 0 0 1 1 1 0
## [112] 2 0 1 0 5 1 1 1 2 1 0 4 0 1 0 1 0 0 0 0 1 0 0 0 0 1 4 0 0 0 1 0 1 0 3 0
## [149] 1 1 1 0 1 2 0 0 0 5 0 1 2 0 4 1 0 0 2 2 0 0 1 1 2 2 1 3 4 0 0 0 1 0 0 0 1
## [186] 1 0 1 6 1 5 0 1 0 0 2 1 0 1 0 1 0 0 0 0 1 0 3 0 3 0 2 1 0 0 0 0 2 1 1 0 2
## [223] 2 0 2 2 0 5 4 1 4 1 0 0 1 0 1 4 2 2 0 0 1 4 0 6 1 0 2 2 0 0 1 0 0 3 1 0 2
```

```
## [260] 1 0 2 1 1 3 1 0 0 0 0 0 0 0 2 0 0 1 0 0 4 0 0 3 0 1 5 2 0 0 1 3 1 1 2 2 0 0
## [297] 0 0 1 0 0 3 4 0 3 0 4 1 1 4 1 4 1 0 1 1 1 0 3 0 2 1 0 0 2 0 1 0 0 0 3 1 0
## [334] 1 2 0 0 1 2 0 0 0 1 0 1 0 0 0 1 2 1 3 0 0 0 3 1 0 0 2 0 0 1 0 1 0 3 1 0 0
## [371] 0 0 2 1 1 3 2 0 3 1 0 1 0 1 0 0 2 2 0 0 0 1 0 1 0 1 2 0 0 0 3 0 0 0 1 0 1
## [408] 2 0 1 2 0 0 1 0 1 2 2 1 2 3 1 0 0 1 0 1 1 0 1 3 1 0 0 1 3 2 4 1 0 0 0 1 1
## [445] 3 0 1 0 1 0 1 1 0 0 2 0 0 2 0 2 0 5 1 1 0 3 4 1 1 1 1 0 6 0 3 0 0 2 1 0 1
## [482] 3 4 0 1 0 0 3 1 0 1 2 2 3 0 3 2 0 0 0 1 1 0 0 0 0 0 0 0 3 3 1 0 0 1 0 0 0
## [519] 0 0 2 0 0 5 0 2 2 3 1 2 0 0 0 0 2 0 0 2 3 0 1 1 1 1 5 1 0 0 0 2 2 0
```

`rnbinom(df$Deceased,size = 1,prob = 0.5)`

```
##   [1] 1 2 2 2 0 1 0 0 0 0 0 0 0 2 0 0 0 1 1 5 1 3 0 0 1 2 0 6 0 0 0 0 1 3 0 1 0
##  [38] 1 0 0 2 0 0 0 0 2 1 1 0 0 2 0 0 0 6 0 0 0 3 4 1 0 3 1 0 1 0 3 2 0 0 6 1 3
##  [75] 0 7 4 2 1 1 0 2 1 1 1 0 0 1 0 2 0 1 0 0 0 1 0 1 2 0 0 0 0 3 0 1 6 3 1 4 0
## [112] 0 0 0 1 0 2 2 0 2 2 0 0 1 1 0 0 1 1 1 1 0 2 2 0 0 0 0 0 0 0 3 0 2 2 0 1
## [149] 0 0 0 1 0 1 0 5 0 0 2 5 3 0 0 1 4 1 2 1 0 1 0 0 0 3 0 2 1 4 3 0 1 0 1 1 0
## [186] 0 2 1 3 2 0 2 1 1 2 3 0 0 0 0 0 1 1 4 0 0 0 0 0 0 0 1 0 1 0 1 0 2 2 0 0 3
## [223] 1 1 0 2 0 1 0 0 0 1 1 2 0 0 0 0 1 0 1 1 0 0 0 1 1 0 0 0 1 1 2 0 0 1 0 0 1
## [260] 0 0 1 1 1 1 0 3 0 0 0 2 0 0 4 0 0 8 1 0 0 0 1 2 0 1 2 1 0 0 0 0 1 0 1 0 2
## [297] 2 1 0 1 1 2 0 2 2 1 1 1 0 0 0 0 1 0 3 0 3 6 1 0 0 0 0 0 1 3 1 0 1 1 1 1 0
## [334] 6 0 0 3 0 1 2 1 1 2 2 0 1 0 1 3 1 0 1 0 0 1 0 3 0 1 0 4 1 1 0 1 2 1 1 0 2
## [371] 5 0 2 1 0 0 0 1 0 1 2 0 0 1 0 4 1 1 2 1 1 0 1 3 0 0 0 0 0 1 1 1 0 0 3 2 0
## [408] 1 0 1 2 3 2 0 1 0 3 9 2 1 0 0 1 2 1 1 0 0 2 0 3 0 2 1 0 2 1 0 5 4 3 2 1 1
## [445] 0 0 0 1 1 1 6 1 0 1 2 1 1 1 1 2 1 0 3 0 1 1 0 2 0 4 5 0 0 0 1 1 2 1 5 0 3
## [482] 7 0 1 0 1 0 0 0 3 0 1 0 0 1 0 1 0 1 0 0 0 3 2 4 1 1 0 3 3 0 0 0 0 0 0 0 0
## [519] 2 0 1 0 0 0 0 0 2 1 0 0 4 0 1 0 2 1 0 0 0 3 0 0 1 0 0 0 1 1 1 1 2 1
```

`rnbinom(df$Confirmed,size = 1,mu=1)`

```
##   [1] 4 0 2 0 0 1 3 0 1 2 1 0 1 2 0 0 0 2 3 0 0 0 1 1 0 1 5 0 0 0 0 0 1 4 2 1 2
##  [38] 0 1 1 0 3 0 1 0 0 0 1 0 0 0 1 0 0 0 0 1 0 5 3 1 2 0 0 0 4 0 3 1 0 4 4 4 1
##  [75] 0 0 0 0 2 1 2 1 0 0 1 0 1 0 4 1 0 0 1 0 3 0 3 1 0 2 0 0 0 0 1 0 0 1 1 0 1
## [112] 0 0 0 3 0 0 0 0 0 2 1 2 0 1 2 0 1 2 1 1 0 2 1 3 0 3 3 0 0 1 0 0 0 2 1 0 1
## [149] 1 0 1 0 0 0 1 1 5 0 0 1 1 2 1 2 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 3 0 1
## [186] 1 1 2 0 0 3 3 0 4 0 0 0 0 0 2 0 0 0 2 1 0 0 0 0 0 0 0 0 0 0 2 0 0 1 2 0 1
## [223] 0 0 1 0 1 0 0 3 0 0 1 1 0 0 0 0 3 4 0 4 1 0 0 2 1 0 2 0 0 1 0 1 1 0 0 3 2
## [260] 2 0 3 2 1 1 1 0 2 0 0 0 1 2 2 5 5 0 0 1 5 0 0 1 0 0 0 3 1 1 2 2 0 1 2 0 0
## [297] 0 0 0 0 2 0 4 4 0 0 0 0 0 0 1 0 0 2 0 1 1 2 0 0 1 6 0 1 1 0 1 1 1 1 0 1 4
## [334] 1 2 0 1 0 1 0 2 0 2 0 0 0 1 0 1 0 1 2 0 3 4 0 0 0 0 0 1 0 1 6 0 1 0 0 1
## [371] 0 2 0 0 3 0 0 0 0 1 0 0 2 1 1 0 0 0 2 1 0 4 0 2 1 1 1 1 3 0 0 2 5 0 0 3 1
## [408] 0 0 0 0 1 0 0 0 0 2 1 4 2 1 3 0 1 0 0 1 0 0 0 1 0 0 0 0 0 1 1 1 2 3 2 1 0
## [445] 0 2 0 0 0 0 4 5 1 0 1 0 0 1 3 0 1 0 0 1 1 3 0 5 0 2 0 1 0 0 0 5 0 0 0 0 8
## [482] 1 0 1 3 1 0 0 0 1 0 1 0 4 0 1 2 2 0 1 0 3 0 1 0 4 0 1 0 0 1 0 7 0 0 0 0 0
## [519] 0 0 1 1 0 2 3 1 0 2 1 0 0 0 2 1 0 1 0 0 0 1 0 0 0 0 0 1 0 1 0 1 1 0
```

`rnbinom(df$Recovered,size = 1,mu=1)`

```
##   [1] 1 0 3 0 0 0 2 3 1 0 4 0 0 2 0 2 0 0 0 0 0 2 5 0 0 0 1 1 0 2 0 1 3 2 0 0 3
##  [38] 0 4 0 0 3 5 2 0 1 0 0 3 0 0 7 1 0 2 1 0 4 1 4 1 1 1 0 2 1 0 1 4 1 1 1 1 2
##  [75] 0 1 0 2 0 3 2 2 1 0 0 1 0 1 2 1 2 0 0 0 0 0 3 1 1 0 0 0 0 0 0 2 2 2 2 0 4
## [112] 0 3 1 0 0 1 3 0 2 0 0 1 3 3 9 0 1 0 3 4 3 0 4 0 2 1 1 0 0 1 1 1 0 2 3 0 0
## [149] 0 2 0 1 0 0 1 0 0 1 1 0 0 4 0 0 0 1 2 1 0 1 0 5 1 0 2 0 0 3 0 0 2 1 0 1 0
## [186] 0 0 0 0 2 0 9 0 1 0 0 1 0 2 1 0 1 2 1 1 0 5 5 1 0 3 0 3 0 0 2 1 1 1 4 3 0
## [223] 1 0 1 1 3 0 2 0 1 0 0 0 0 0 0 2 0 0 0 1 1 5 9 3 1 0 2 1 1 0 1 2 0 1 1 1 3
## [260] 2 0 1 5 1 0 0 0 0 0 2 4 1 0 0 0 0 0 2 3 1 2 0 1 0 0 1 0 3 1 0 3 1 3 5 0 2
## [297] 3 2 0 0 0 2 0 4 0 0 0 0 1 1 0 0 0 0 0 0 1 2 0 0 1 1 0 0 4 4 0 0 0 0 0 0 0
```
```

```
## [334] 2 0 1 0 0 1 0 0 2 0 1 0 0 0 2 0 0 0 3 0 2 0 2 0 0 0 0 3 1 1 0 3 3 1 0 1 1
## [371] 0 2 3 0 0 6 0 0 0 1 0 1 1 2 0 0 0 1 7 1 0 2 0 1 0 1 2 1 0 0 4 5 1 0 0 0 0
## [408] 0 0 1 1 1 1 0 0 0 5 1 0 0 0 0 0 1 0 2 0 0 0 0 2 1 1 0 0 0 3 0 4 0 1 3 0 0
## [445] 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 4 1 3 0 0 2 1 0 0 1 0 1 0 1 0 1 1 1 1 2 0 4
## [482] 4 0 2 0 0 0 2 1 2 5 0 1 2 2 0 1 0 0 0 0 1 0 1 1 1 0 2 0 0 1 0 1 0 0 0 0 0
## [519] 0 0 1 1 7 0 1 4 0 1 0 1 0 1 1 1 2 0 2 0 0 0 0 2 2 1 7 0 2 0 1 0 0 0
```

```
rnbinom(df$Deceased,size = 1,mu=1)
```

```
##   [1] 2 1 0 0 0 2 2 5 0 1 1 1 0 0 2 0 1 1 0 0 0 0 0 2 0 3 1 0 4 0 2 0 0 1 0 2 1
##  [38] 1 2 0 0 0 0 0 3 3 0 0 1 0 0 2 0 1 0 0 5 2 1 1 0 0 1 2 1 1 1 1 0 1 0 0 1 0 0
##  [75] 1 1 1 0 5 0 2 1 2 0 3 0 1 0 3 1 1 4 1 3 0 0 1 1 0 3 0 2 0 0 1 0 0 1 2 0 0
## [112] 3 0 1 0 2 5 1 0 2 2 0 0 0 0 0 0 0 4 0 0 2 0 2 0 0 0 0 1 0 0 0 0 1 4 0 3 0
## [149] 1 0 0 0 0 0 0 0 2 1 0 1 0 4 0 4 0 1 0 4 0 0 1 0 0 1 0 1 0 2 0 1 1 0 1 0 1
## [186] 0 0 0 1 0 2 1 3 0 0 0 0 2 0 0 0 0 1 6 0 0 0 0 0 2 2 0 0 0 2 1 0 0 1 1 0 3
## [223] 0 0 0 1 1 0 0 1 1 1 0 0 0 3 0 0 1 1 0 0 2 0 1 3 1 2 0 0 1 0 0 1 0 0 1 1 0
## [260] 0 0 3 0 0 4 0 0 0 1 2 0 1 1 2 0 3 0 0 0 0 0 4 5 1 0 0 0 0 0 0 0 1 0 0 2 0
## [297] 0 0 1 0 0 4 0 1 0 2 0 1 1 2 0 0 2 0 0 0 3 2 0 0 0 0 0 0 0 2 2 0 0 2 0 2
## [334] 0 0 0 1 0 0 2 0 0 1 0 4 1 0 0 0 6 1 0 2 0 0 2 0 1 2 0 5 1 6 0 0 0 0 2 0 1
## [371] 4 6 0 2 7 1 0 1 1 4 0 1 0 1 0 0 1 0 0 0 0 1 2 1 3 5 1 0 0 3 0 2 3 0 0 2 0
## [408] 1 0 1 2 0 1 0 2 1 0 1 0 0 1 0 0 1 2 3 0 0 2 0 2 1 0 2 0 2 1 1 0 1 0 2 6 2
## [445] 1 1 0 0 0 0 1 0 1 0 0 3 1 3 0 0 0 0 2 0 0 1 0 0 2 0 1 0 0 5 0 2 0 0 1 2 2
## [482] 0 3 0 0 1 2 3 2 3 1 1 1 1 2 4 0 8 1 9 0 1 5 0 0 3 5 2 2 0 0 0 1 2 1 0 3 1
## [519] 1 2 0 2 2 5 2 1 0 3 0 0 0 1 3 0 1 1 3 0 1 1 0 0 0 1 1 2 0 2 0 5 2 1
```

```
runif(df$Confirmed, min=0, max=1)
```

```
##   [1] 0.045020454 0.738932374 0.397932729 0.716249117 0.214412129 0.868166997
##   [7] 0.661072716 0.143055011 0.078807284 0.013300165 0.297030462 0.353667435
##  [13] 0.772867405 0.604099600 0.337685407 0.286982042 0.848778366 0.869464759
##  [19] 0.941587651 0.768022543 0.747148407 0.463785940 0.830578257 0.765392384
##  [25] 0.815745990 0.885925870 0.744223030 0.007769534 0.583994446 0.692180663
##  [31] 0.742557811 0.431773237 0.241792642 0.716994330 0.164301109 0.340178655
##  [37] 0.987469369 0.081386290 0.282528639 0.927519315 0.913773263 0.421917430
##  [43] 0.103963253 0.332941123 0.831858317 0.337224345 0.142219912 0.030804925
##  [49] 0.658356651 0.514795488 0.380000919 0.324321952 0.800123026 0.010636387
##  [55] 0.920812620 0.981616233 0.586928958 0.709353707 0.134943575 0.619347199
##  [61] 0.552270350 0.109994383 0.504960687 0.826989692 0.824802561 0.994815672
##  [67] 0.913628423 0.227270552 0.820020400 0.118287747 0.751365646 0.231154864
##  [73] 0.387449146 0.563680161 0.211544418 0.671645904 0.173466361 0.869203229
##  [79] 0.071642138 0.604203098 0.579070619 0.736462598 0.133000060 0.792142645
##  [85] 0.581114257 0.660398851 0.386350860 0.984680918 0.283138788 0.851290747
##  [91] 0.811285571 0.584912573 0.507659228 0.252762414 0.398652884 0.282205594
##  [97] 0.079484084 0.865790796 0.255088223 0.255994916 0.103368236 0.359864247
## [103] 0.136697408 0.200393325 0.563931999 0.438475452 0.152988343 0.215702280
## [109] 0.972261881 0.456443675 0.255859596 0.136936689 0.234119348 0.555071435
## [115] 0.777987956 0.421421552 0.132097823 0.496615713 0.793166653 0.891332191
## [121] 0.301135891 0.198655916 0.046835044 0.790657853 0.553133249 0.660238282
## [127] 0.180885537 0.576686058 0.325944785 0.481727594 0.778019144 0.338127593
## [133] 0.309426648 0.186170829 0.771749416 0.505384355 0.160584218 0.240740432
## [139] 0.106971338 0.773106751 0.528274924 0.615892660 0.380605232 0.568287586
## [145] 0.074554882 0.054579554 0.207113120 0.277950875 0.512325528 0.320644844
## [151] 0.295553487 0.049196719 0.182359366 0.407088793 0.530155108 0.887913658
## [157] 0.448006992 0.197747891 0.264512683 0.894946813 0.694365598 0.241104548
## [163] 0.996425428 0.647723876 0.910957034 0.116723213 0.185729061 0.376349412
```

```
## [169] 0.285116693 0.702813136 0.790330090 0.346328349 0.249266826 0.569678960
## [175] 0.573703010 0.232138166 0.364303538 0.176564916 0.715992346 0.406349345
## [181] 0.332234964 0.759351206 0.991915840 0.691008598 0.423061947 0.734932608
## [187] 0.905501427 0.267877195 0.831544331 0.066387382 0.615607239 0.275685062
## [193] 0.927680327 0.418932255 0.522896288 0.653795371 0.093178663 0.346144774
## [199] 0.822751872 0.038728050 0.989428667 0.166112472 0.495410706 0.457823670
## [205] 0.844669275 0.170757326 0.156612029 0.626496956 0.754630442 0.829246383
## [211] 0.560104102 0.405944077 0.631693253 0.886906228 0.099902671 0.379163042
## [217] 0.651538360 0.083099568 0.569134798 0.621670477 0.212563506 0.203979435
## [223] 0.419502964 0.724833199 0.290097917 0.587648242 0.530231007 0.916523526
## [229] 0.385514572 0.360632466 0.046963373 0.726250579 0.050642286 0.474066678
## [235] 0.151308712 0.272006448 0.594223855 0.425149899 0.656800075 0.329366831
## [241] 0.129175884 0.188621491 0.755956016 0.164155795 0.969619301 0.570507671
## [247] 0.810351883 0.013212495 0.164095781 0.099107552 0.436867301 0.120584997
## [253] 0.251371944 0.194366627 0.747751912 0.216907599 0.420939208 0.826153693
## [259] 0.390902225 0.535397303 0.396981266 0.262756564 0.689648825 0.797035138
## [265] 0.545403965 0.718132178 0.845866368 0.523420363 0.647544825 0.760122462
## [271] 0.018682546 0.945596658 0.572980646 0.350276329 0.536689716 0.218208562
## [277] 0.420171200 0.973544359 0.359059826 0.884912527 0.505068302 0.087395680
## [283] 0.083254711 0.261218228 0.286787033 0.211375461 0.372689862 0.189574586
## [289] 0.185251747 0.905260769 0.299034841 0.669599031 0.373343009 0.699169178
## [295] 0.625865215 0.165066442 0.616073249 0.349768749 0.862401541 0.830134102
## [301] 0.238226909 0.088997212 0.595580240 0.980116963 0.364970940 0.241019904
## [307] 0.016792853 0.160341502 0.904278979 0.533901089 0.091332878 0.810526319
## [313] 0.815303784 0.644699914 0.616386655 0.376739523 0.361823272 0.319511204
## [319] 0.309801599 0.450234722 0.830563522 0.746396325 0.854959594 0.882086960
## [325] 0.427812951 0.695664948 0.498294740 0.158829468 0.534468169 0.535459659
## [331] 0.168180748 0.371761143 0.790812091 0.076585907 0.051324775 0.462372599
## [337] 0.425794001 0.622797009 0.111598841 0.190876893 0.825974311 0.960871033
## [343] 0.484840118 0.213352388 0.434803029 0.193118545 0.416323237 0.888738999
## [349] 0.100834193 0.624170559 0.042094013 0.887761970 0.117284914 0.696310090
## [355] 0.857150852 0.610845152 0.042118981 0.526103713 0.390092428 0.732526838
## [361] 0.175036054 0.760614681 0.608347491 0.421323968 0.410900691 0.593166257
## [367] 0.558399319 0.833118273 0.168820759 0.641555065 0.634360709 0.490538158
## [373] 0.542277258 0.792431463 0.580002901 0.215688528 0.154424632 0.477298643
## [379] 0.464356763 0.509136418 0.905625524 0.819334870 0.059703903 0.623960088
## [385] 0.352937408 0.560540017 0.840298987 0.225902902 0.861527904 0.557664162
## [391] 0.378717022 0.243807416 0.749910372 0.343844226 0.794385186 0.021913372
## [397] 0.980997449 0.717050212 0.092859197 0.916955235 0.788323455 0.405071527
## [403] 0.142659874 0.731196440 0.664382704 0.989765498 0.508833878 0.073693688
## [409] 0.418212797 0.483629296 0.162584409 0.120228186 0.873424039 0.102426564
## [415] 0.476098172 0.179646971 0.375280476 0.974939367 0.415140280 0.553603504
## [421] 0.160211938 0.949219468 0.304727816 0.094884978 0.944229156 0.283123083
## [427] 0.074505399 0.471177656 0.439982784 0.151761239 0.141283089 0.424519669
## [433] 0.488347394 0.736746443 0.589085383 0.855012153 0.601557837 0.057306635
## [439] 0.793571410 0.087727033 0.061459893 0.930294179 0.526682610 0.547052868
## [445] 0.586572128 0.998826602 0.873873809 0.949950893 0.897423428 0.834112034
## [451] 0.480342857 0.183580162 0.598671438 0.347306658 0.365844123 0.360341114
## [457] 0.032958839 0.500043157 0.241955474 0.455073211 0.026052342 0.374510526
## [463] 0.777903161 0.532368116 0.834645063 0.503519581 0.666313491 0.331882504
## [469] 0.583550917 0.236724348 0.603861260 0.028975678 0.207889495 0.957127053
## [475] 0.598266413 0.265049135 0.029991530 0.117474238 0.203508735 0.146552554
## [481] 0.559761627 0.906167334 0.823253240 0.066434689 0.492935518 0.622266612
## [487] 0.091819001 0.746582221 0.730614057 0.012021230 0.123052616 0.323480451
```

```
## [493] 0.661047890 0.819408029 0.832743632 0.621935836 0.505358048 0.434550946
## [499] 0.942209881 0.258082086 0.190073556 0.943036720 0.154513347 0.681231173
## [505] 0.184816962 0.161767930 0.285919032 0.215808612 0.322128039 0.280476394
## [511] 0.183389380 0.934771913 0.701234657 0.373913283 0.113920373 0.141344489
## [517] 0.445633650 0.476404173 0.892946531 0.789136315 0.362832778 0.738699523
## [523] 0.369835690 0.442698333 0.267045711 0.227458533 0.398333739 0.540437237
## [529] 0.031365674 0.216075794 0.263513283 0.249909126 0.980416264 0.337960366
## [535] 0.060069840 0.957966383 0.263903296 0.670393787 0.186847860 0.925346348
## [541] 0.724425655 0.014639279 0.311671946 0.743368620 0.338347710 0.432272436
## [547] 0.479828480 0.930073490 0.568109045 0.628952866 0.422564404 0.262757868
```

```r
runif(df$Recovered, min=0, max=1)
```

```
##   [1] 0.908266562 0.414545749 0.134724758 0.219875118 0.503363171 0.035880514
##   [7] 0.726363162 0.729363191 0.195973776 0.488997473 0.391233599 0.989548081
##  [13] 0.711698785 0.979409514 0.187390391 0.826781439 0.144388199 0.657000485
##  [19] 0.193116107 0.287289166 0.157856132 0.201435050 0.155164841 0.394752721
##  [25] 0.453462819 0.981305929 0.054118087 0.772237213 0.125003894 0.790449836
##  [31] 0.053627934 0.389983986 0.023067528 0.073550762 0.053477205 0.961153087
##  [37] 0.079880395 0.022639249 0.267358372 0.607156493 0.911583430 0.593657393
##  [43] 0.024103305 0.910574908 0.913199548 0.785398894 0.510220191 0.660082038
##  [49] 0.183649753 0.889486188 0.530133930 0.266882549 0.248386056 0.445838171
##  [55] 0.118528694 0.730302136 0.623516824 0.743013253 0.042542047 0.073433196
##  [61] 0.232207976 0.972447181 0.952087170 0.809107052 0.912111252 0.667081828
##  [67] 0.202617915 0.633568511 0.832721510 0.814206840 0.007387242 0.748874260
##  [73] 0.723304587 0.312700956 0.579832838 0.418413923 0.312055930 0.056549205
##  [79] 0.530386350 0.173967667 0.293636347 0.691471762 0.067924777 0.147727346
##  [85] 0.317021264 0.736934302 0.876513386 0.140394911 0.998085360 0.948474274
##  [91] 0.416863278 0.103662420 0.100332587 0.137734732 0.578153769 0.221192637
##  [97] 0.027293783 0.866405028 0.340778634 0.531955580 0.051964405 0.503209871
## [103] 0.825865643 0.001013952 0.487169946 0.046792225 0.227904592 0.694037077
## [109] 0.848941891 0.554066985 0.752975587 0.928156144 0.792529776 0.530065892
## [115] 0.021582909 0.997208974 0.982517144 0.142739082 0.580342606 0.249174758
## [121] 0.663211869 0.070018374 0.531115797 0.193444284 0.108779102 0.477696542
## [127] 0.321641954 0.113614717 0.597483844 0.125159419 0.878059017 0.363291712
## [133] 0.372431419 0.780083243 0.620520877 0.721257536 0.500598501 0.690063475
## [139] 0.775192115 0.683297446 0.792613284 0.516640959 0.814950764 0.914756461
## [145] 0.022814793 0.165254029 0.510125876 0.583577613 0.680576084 0.837217884
## [151] 0.075458935 0.365158064 0.780122494 0.949390105 0.911031381 0.954204059
## [157] 0.166358572 0.257815952 0.962895658 0.045409489 0.759842710 0.557459155
## [163] 0.569857367 0.622935277 0.921768020 0.581202749 0.493984362 0.152876548
## [169] 0.373250710 0.794186990 0.074288871 0.225666692 0.392272464 0.347575733
## [175] 0.707888201 0.063899195 0.269586778 0.211678099 0.598599706 0.531367500
## [181] 0.731574014 0.434865796 0.399414508 0.433100722 0.900163651 0.458564269
## [187] 0.804934700 0.528761900 0.948590062 0.250522956 0.008966895 0.441074812
## [193] 0.729121366 0.982987611 0.090270975 0.545099866 0.225018268 0.885484419
## [199] 0.451789502 0.855489607 0.835329672 0.225051196 0.372956367 0.116199250
## [205] 0.242375133 0.256200618 0.535135612 0.884759866 0.929938919 0.253419982
## [211] 0.673355966 0.112778329 0.945447631 0.081784329 0.089441756 0.986729968
## [217] 0.226812255 0.647290035 0.301659762 0.589205156 0.263003311 0.031596754
## [223] 0.281243534 0.758219022 0.354679431 0.216395096 0.229685850 0.230659574
## [229] 0.484800101 0.574552195 0.614747527 0.129562047 0.887359639 0.926046528
## [235] 0.722765621 0.997172869 0.620338095 0.023627960 0.408194261 0.436927943
## [241] 0.887540567 0.836125535 0.176744830 0.106454874 0.034787966 0.910793262
## [247] 0.976053149 0.741958333 0.332937703 0.982007100 0.984698398 0.383626307
```

```
## [253] 0.104660728 0.481156229 0.041344155 0.222358152 0.121651200 0.621279147
## [259] 0.825290524 0.553322436 0.937653741 0.717123859 0.437719674 0.417330457
## [265] 0.474655292 0.962054396 0.402931008 0.151753891 0.830670120 0.632903465
## [271] 0.183952137 0.639170564 0.723972069 0.618288547 0.699211643 0.647160312
## [277] 0.821334414 0.400290381 0.418345994 0.729262372 0.805449804 0.686878488
## [283] 0.077572488 0.281105762 0.897666344 0.593056007 0.466550511 0.039391589
## [289] 0.598687133 0.261229503 0.892022124 0.907309468 0.919543715 0.203581583
## [295] 0.921150152 0.549233584 0.868116032 0.006945148 0.127424716 0.800024676
## [301] 0.203440538 0.296518503 0.519380294 0.803194760 0.915397812 0.056090660
## [307] 0.713643174 0.309049462 0.506639598 0.135046172 0.564444485 0.460644376
## [313] 0.605093787 0.014519756 0.228887531 0.148990211 0.750084074 0.459173153
## [319] 0.070758981 0.121145487 0.072462420 0.180599023 0.463484359 0.724148029
## [325] 0.469915847 0.453580512 0.559183809 0.243925109 0.344008094 0.075686888
## [331] 0.924506575 0.173112847 0.817456250 0.420838480 0.215851253 0.282356850
## [337] 0.621538604 0.291161516 0.284371230 0.155326588 0.696865413 0.439033748
## [343] 0.205096042 0.526695331 0.254285880 0.189286616 0.536771251 0.189477075
## [349] 0.404824261 0.774345045 0.769398543 0.012586887 0.074171777 0.364128489
## [355] 0.147070006 0.498745425 0.481415463 0.676733774 0.380983701 0.251319494
## [361] 0.360471247 0.112899484 0.965402437 0.974777526 0.237345924 0.907177174
## [367] 0.275455395 0.978317715 0.225527829 0.556547945 0.779641990 0.270396605
## [373] 0.419852683 0.515812382 0.262242593 0.525952659 0.119900763 0.209288583
## [379] 0.957519906 0.241063422 0.206073807 0.643992299 0.368681398 0.711303463
## [385] 0.976294317 0.560926812 0.641308010 0.202164119 0.070507230 0.355083607
## [391] 0.202460118 0.048722569 0.097686483 0.313126277 0.464242644 0.751427347
## [397] 0.817016316 0.843276849 0.132092856 0.395509121 0.310643760 0.202541472
## [403] 0.576469572 0.697074078 0.648883264 0.434498004 0.533947203 0.796069933
## [409] 0.480568701 0.268922458 0.433001141 0.625593278 0.657650267 0.605498801
## [415] 0.623977482 0.459991521 0.725421157 0.942590651 0.559622194 0.122112699
## [421] 0.662511804 0.584755941 0.350806738 0.687186936 0.693752154 0.806951125
## [427] 0.611060543 0.860484731 0.522434429 0.500098593 0.327566757 0.852923611
## [433] 0.661708181 0.541938718 0.361448852 0.702398082 0.176814239 0.317859998
## [439] 0.090719291 0.862715687 0.701116131 0.243285810 0.851638988 0.433014631
## [445] 0.094332867 0.744079222 0.011546733 0.684200900 0.366719325 0.927944011
## [451] 0.079383467 0.086046899 0.263143938 0.672558868 0.060862940 0.797337448
## [457] 0.091897069 0.385173999 0.783567906 0.332057495 0.739371324 0.058659494
## [463] 0.744851485 0.094053511 0.998923087 0.615107702 0.161372907 0.242147541
## [469] 0.205161572 0.157964228 0.711142863 0.881165632 0.756733547 0.166580815
## [475] 0.682007136 0.755495087 0.814978741 0.168957189 0.208598901 0.155731199
## [481] 0.358936037 0.067925798 0.762306782 0.939468089 0.621893970 0.799769643
## [487] 0.534586589 0.909855612 0.782723442 0.442104449 0.380361521 0.872911940
## [493] 0.899151553 0.555201618 0.143904011 0.993307220 0.150770114 0.948526484
## [499] 0.699942680 0.208978476 0.877825209 0.332280952 0.382716689 0.393307544
## [505] 0.711536987 0.942048944 0.838354353 0.633091510 0.822958329 0.347681463
## [511] 0.914654647 0.467418297 0.733612016 0.418618056 0.324918726 0.721934979
## [517] 0.986545771 0.027475605 0.691526335 0.671717319 0.411088206 0.895932481
## [523] 0.002313742 0.750787646 0.601749640 0.511188412 0.980033686 0.204038758
## [529] 0.166491756 0.321998367 0.526156453 0.216799010 0.921969626 0.770326854
## [535] 0.650750256 0.038158838 0.834624511 0.210463350 0.046165217 0.362344857
## [541] 0.073993747 0.974398986 0.961186204 0.611254961 0.081121191 0.897556456
## [547] 0.204688569 0.137121845 0.160511421 0.780047518 0.378019709 0.063717220
```

```r
runif(df$Deceased, min=0, max=1)
```

```
##   [1] 0.971256475 0.047875939 0.708322707 0.638098783 0.021931558 0.153593679
##   [7] 0.368009209 0.618919796 0.774446838 0.915919916 0.553225103 0.957340438
```

```
##  [13] 0.927968289 0.713895756 0.062502058 0.051255534 0.075192957 0.071753714
##  [19] 0.385366305 0.553439624 0.860495034 0.175416099 0.831654340 0.686343609
##  [25] 0.777773960 0.122221510 0.110998483 0.824979813 0.864759531 0.792004098
##  [31] 0.592449799 0.876259413 0.156689730 0.948461249 0.137041237 0.784844329
##  [37] 0.201213134 0.260989590 0.645867144 0.594555484 0.355143863 0.047106562
##  [43] 0.901568197 0.403172952 0.838039254 0.891175707 0.530068321 0.759573904
##  [49] 0.451908582 0.480730896 0.633332236 0.518979701 0.421233641 0.981337695
##  [55] 0.657478478 0.915392136 0.910162211 0.812802340 0.929879606 0.402390130
##  [61] 0.772251746 0.419445807 0.348607068 0.241966332 0.223722372 0.447337039
##  [67] 0.156870941 0.998412470 0.509364666 0.355616525 0.895479594 0.326816509
##  [73] 0.466869161 0.087334851 0.839281408 0.645778105 0.997343456 0.060062727
##  [79] 0.784208774 0.540654202 0.615440399 0.591375125 0.751027809 0.249387771
##  [85] 0.026330937 0.617089561 0.877974491 0.763790607 0.085326050 0.805554740
##  [91] 0.977220277 0.151835267 0.592412223 0.224933991 0.711419612 0.690148991
##  [97] 0.862695919 0.548563367 0.414239967 0.604978980 0.706078758 0.864395153
## [103] 0.057663315 0.694348071 0.652376996 0.103800274 0.965938512 0.280201241
## [109] 0.199530252 0.182880252 0.295064953 0.466121272 0.563341863 0.143080259
## [115] 0.207653168 0.286344228 0.640011484 0.384812390 0.714991233 0.952334983
## [121] 0.287090488 0.696017888 0.655665899 0.155808264 0.295656651 0.415455301
## [127] 0.841728344 0.865594972 0.718564641 0.409391639 0.685787897 0.557401268
## [133] 0.146975187 0.498523264 0.544917301 0.343840345 0.268740122 0.928710595
## [139] 0.407752523 0.838309218 0.528102031 0.657746378 0.995274483 0.112443571
## [145] 0.374624068 0.772183905 0.599038575 0.367901929 0.052252527 0.380203792
## [151] 0.886496211 0.301273411 0.480732050 0.791222326 0.607444934 0.832015804
## [157] 0.176676868 0.912280342 0.214266020 0.095715074 0.959390071 0.248167083
## [163] 0.332464405 0.764351975 0.758039688 0.948381670 0.317690336 0.027166123
## [169] 0.176504531 0.946718556 0.695966812 0.654779145 0.910180645 0.281458337
## [175] 0.580367572 0.904851454 0.811381024 0.712546432 0.344797437 0.047054346
## [181] 0.280370558 0.910688355 0.235852979 0.087884014 0.800852094 0.257602410
## [187] 0.650121320 0.172563772 0.922978161 0.802678645 0.979902146 0.200642142
## [193] 0.789405430 0.166059858 0.165733106 0.527687544 0.046093547 0.812116339
## [199] 0.595534081 0.308176301 0.095550630 0.059278984 0.283715311 0.313373628
## [205] 0.620641648 0.853966119 0.108831475 0.534283634 0.789862627 0.024793335
## [211] 0.324556476 0.248179899 0.824599734 0.700143588 0.500103849 0.301350297
## [217] 0.754223339 0.935680224 0.732105982 0.809028205 0.340722356 0.221801473
## [223] 0.599566035 0.943690066 0.770496551 0.308614560 0.437127977 0.167800887
## [229] 0.543393454 0.842606446 0.760291069 0.831735481 0.995798720 0.447345224
## [235] 0.200821184 0.546785468 0.670653993 0.538216960 0.598592866 0.177797300
## [241] 0.184642992 0.784568035 0.735645719 0.281720973 0.968913049 0.497838574
## [247] 0.964190069 0.818410686 0.344645881 0.353096190 0.009086708 0.182927103
## [253] 0.984441736 0.152839474 0.247369953 0.805651466 0.315477688 0.812640843
## [259] 0.458408407 0.257683486 0.453767634 0.129934355 0.602689881 0.843469106
## [265] 0.998826869 0.265617685 0.229994063 0.133241847 0.453888642 0.897093982
## [271] 0.056448324 0.789657394 0.994633914 0.209283192 0.682010532 0.036813014
## [277] 0.346107990 0.772662491 0.575095239 0.255591206 0.724556332 0.798605951
## [283] 0.362302633 0.779764899 0.334062753 0.477695903 0.851259764 0.375132748
## [289] 0.619855358 0.965347410 0.063094129 0.050834212 0.939808095 0.068042906
## [295] 0.245367966 0.187152568 0.541601980 0.662427345 0.014479934 0.023421546
## [301] 0.068653917 0.911687865 0.173597431 0.933413429 0.830255915 0.506446555
## [307] 0.535925083 0.112765930 0.158302439 0.427708173 0.087861234 0.056124563
## [313] 0.716386194 0.334139437 0.278115782 0.712393489 0.883844969 0.520773474
## [319] 0.211180823 0.289232832 0.549723736 0.404998048 0.435858879 0.642387325
## [325] 0.915947858 0.775086747 0.103927260 0.304756595 0.647130195 0.738305331
## [331] 0.165637316 0.244513112 0.682844073 0.390179096 0.386333534 0.786178107
```

```
## [337] 0.016923453 0.699413834 0.422379293 0.488295975 0.293682147 0.166882954
## [343] 0.166006656 0.390737555 0.900124054 0.486365692 0.102760181 0.929345131
## [349] 0.989242459 0.865697317 0.694160165 0.406202063 0.186177775 0.809591695
## [355] 0.092384664 0.092009875 0.407504543 0.523920966 0.024193453 0.418523332
## [361] 0.256856999 0.774608575 0.445350066 0.291884878 0.695368126 0.098217637
## [367] 0.784997040 0.500697061 0.739297025 0.809742090 0.527714512 0.826785704
## [373] 0.776952129 0.188007409 0.068727257 0.313221221 0.270495352 0.901061370
## [379] 0.212899005 0.717441700 0.051021026 0.788688795 0.274059507 0.839697808
## [385] 0.157522535 0.845923919 0.840092369 0.810794946 0.356838752 0.043073400
## [391] 0.435424064 0.046845758 0.237158576 0.095043102 0.862612006 0.658175880
## [397] 0.002445347 0.529379638 0.224532516 0.848370433 0.159191322 0.723164092
## [403] 0.548753586 0.134595104 0.898661138 0.958990978 0.767165113 0.110988771
## [409] 0.826454869 0.238309780 0.763171002 0.993302902 0.658802543 0.498127349
## [415] 0.322511790 0.517494518 0.948398103 0.343848660 0.578305467 0.505269245
## [421] 0.412005882 0.157931927 0.621017161 0.610522905 0.772710100 0.921541144
## [427] 0.334282868 0.405437340 0.302878577 0.478944468 0.921981259 0.918100027
## [433] 0.881317995 0.807814382 0.065872704 0.919217438 0.516326833 0.639673047
## [439] 0.719578249 0.420299203 0.111780513 0.840132829 0.553183831 0.971082093
## [445] 0.829977359 0.479015284 0.059008556 0.125323680 0.409654121 0.785022810
## [451] 0.294043054 0.362051682 0.183422459 0.684838902 0.907397285 0.341889119
## [457] 0.795651871 0.560885039 0.850123778 0.066218567 0.242150295 0.365819587
## [463] 0.846185682 0.920144862 0.730675509 0.637832882 0.446933625 0.019403830
## [469] 0.392016699 0.663149404 0.263109495 0.098245084 0.240245032 0.529099218
## [475] 0.159334495 0.423436889 0.368153233 0.589178656 0.852009839 0.730010719
## [481] 0.296094081 0.340484944 0.745837561 0.357373282 0.434756747 0.196986039
## [487] 0.140083626 0.038694926 0.180472298 0.339033821 0.501966373 0.296010531
## [493] 0.975275306 0.894868250 0.231044406 0.926594060 0.525434714 0.052426377
## [499] 0.332654356 0.627540294 0.880089695 0.342036241 0.675104222 0.200241823
## [505] 0.124452169 0.428062695 0.746592949 0.551178586 0.417852753 0.924265784
## [511] 0.387786701 0.722426556 0.953354508 0.238421380 0.467175520 0.774746162
## [517] 0.121980156 0.127277817 0.215832121 0.599225241 0.090063641 0.318446994
## [523] 0.966196199 0.157375764 0.663705068 0.358705059 0.036616189 0.751869404
## [529] 0.305186098 0.346927191 0.584067772 0.341576590 0.189479119 0.425695559
## [535] 0.940017745 0.961583888 0.990573352 0.837536366 0.993473668 0.329954102
## [541] 0.758889097 0.325546765 0.735377795 0.577472236 0.194902932 0.723402940
## [547] 0.726230175 0.015568980 0.005306724 0.609244812 0.016517206 0.088540478
```

```r
dunif(df$Confirmed, min = 0, max = 1, log = TRUE)
```

```
##   [1]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
##  [16]    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
##  [31]    0    0    0    0    0    0    0    0    0 -Inf -Inf    0 -Inf -Inf    0
##  [46] -Inf -Inf    0    0    0 -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [61] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [76] -Inf    0 -Inf    0 -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
##  [91] -Inf -Inf    0 -Inf    0    0 -Inf    0    0    0 -Inf -Inf -Inf -Inf -Inf
## [106] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [121] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [136] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [151] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [166] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [181] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [196] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [211] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [226] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
```

```
## [241] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [256] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [271] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [286] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [301] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [316] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [331] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [346] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [361] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [376] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [391] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [406] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [421] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [436] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [451] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [466] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [481] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [496] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [511] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [526] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
## [541] -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf -Inf
```

```r
dunif(df$Confirmed, min = 0, max = 1, log = FALSE)
```

```
##   [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [38] 1 1 0 0 1 0 0 1 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [75] 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0
## [112] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [149] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [186] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [223] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [260] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [297] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [334] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [371] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [408] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [445] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [482] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [519] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```r
dunif(df$Recovered, min = 0, max = 1, log = FALSE)
```

```
##   [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [38] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0
##  [75] 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 1 0 1 1 1 1 0 1 0 1 0 1 1
## [112] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [149] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [186] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [223] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [260] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [297] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [334] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [371] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [408] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [445] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
## [482] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [519] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

dunif(df$Deceased, min = 0, max = 1, log = FALSE)

```
##   [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [38] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 0 0 0 1 1 0 1 0 0 1 1 1 0 0 0 0 0 1 0 0 0
## [186] 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [223] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [260] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [297] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [334] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [371] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [408] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [445] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [482] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [519] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

punif(df$Confirmed, min = 0, max = 1, lower.tail = TRUE, log.p = FALSE)

```
##   [1] 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 1 1 0 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 0 1 0 0 1 1 1 1 1 1 1 1 1 1 1
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

punif(df$Confirmed, min = 0, max = 1, lower.tail = FALSE, log.p = FALSE)

```
##   [1] 1 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
##  [38] 1 1 0 0 1 0 0 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [75] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0
## [112] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [149] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [186] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [223] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [260] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [297] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [334] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [371] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [408] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [445] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [482] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [519] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
punif(df$Recovered, min = 0, max = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1
##  [75] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 1 0 1 0 0 0
## [112] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [149] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
punif(df$Deceased, min = 0, max = 1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
##  [38] 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0
##  [75] 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
## [112] 0 0 1 0 1 1 0 0 1 1 1 1 0 1 0 1 0 1 0 1 0 1 0 1 1 1 0 0 1 0 0 1 0 0 0 0 1 0 0
## [149] 0 0 0 1 1 1 0 0 0 0 1 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [186] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [223] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [260] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [297] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [334] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [371] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [408] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [445] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [482] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [519] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
qunif(df$Confirmed, min = 0, max = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qunif(df$Confirmed, min = 0, max = 1, lower.tail = TRUE, log.p =
## FALSE): NaNs produced
```

```
##   [1]   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0   1 NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN   1 NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0   1 NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
qunif(df$Recovered, min = 0, max = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qunif(df$Recovered, min = 0, max = 1, lower.tail = TRUE, log.p =
## FALSE): NaNs produced
```

```
##   [1]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [55]   0   0   0 NaN NaN NaN   0 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN   1 NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN NaN NaN   1 NaN   0 NaN NaN NaN   1 NaN   0   0   1 NaN   0 NaN
## [109]   0   0   0 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
qunif(df$Deceased, min = 0, max = 1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qunif(df$Deceased, min = 0, max = 1, lower.tail = TRUE, log.p =
## FALSE): NaNs produced
```

```
##   [1]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [55]   0   0   0   0   1   0   0   1   0   0   0   0   0   0   0   0   0   0
##  [73]   0   0   0   0   0   0   0   0   0   0   0   0   0   1   0   0   0   0
##  [91]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## [109]   0   0   0   0   0   1   0   1   1   0   0   1   1   1   1   0   1   0
## [127] NaN   0   1   0   1   0   1   1   1   0   0   1   0   0   1   0   0   0
## [145]   0   1   0   0   0   0   0   1   1   1   0   0   0   0 NaN   0   0   0
## [163]   0 NaN NaN NaN   1   1 NaN   1 NaN NaN   1   1   1 NaN NaN NaN NaN NaN
## [181] NaN   1 NaN NaN NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
dwilcox(df$Confirmed, m=1, n=1, log = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.0 0.0 0.5 0.0 0.0 0.5 0.0 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0
##  [55] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [73] 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [91] 0.0 0.0 0.5 0.0 0.5 0.5 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [109] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [127] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [145] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [163] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [181] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```
## [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
dwilcox(df$Recovered, m=1, n=1, log = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55] 0.5 0.5 0.5 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [73] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.5 0.0 0.0 0.0
##  [91] 0.0 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.0 0.0 0.0 0.5 0.0 0.5 0.5 0.5 0.0 0.5 0.0
## [109] 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [127] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [145] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [163] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [181] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
dwilcox(df$Deceased, m=1, n=1, log = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [73] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
```

```
##   [91] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [109] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [127] 0.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [145] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.0 0.5 0.5 0.5
## [163] 0.5 0.0 0.0 0.0 0.0 0.5 0.5 0.0 0.5 0.0 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0
## [181] 0.0 0.5 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
pwilcox(df$Confirmed, m=1, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.5 0.5 0.5 1.0 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 1.0 1.0 0.5 1.0 1.0 0.5 1.0 1.0 0.5 0.5 1.0 1.0 1.0 1.0 1.0
##  [55] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [73] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [91] 1.0 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [109] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [127] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [145] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [163] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
pwilcox(df$Recovered, m=1, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [55] 0.5 0.5 0.5 1.0 1.0 1.0 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##   [73] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##   [91] 1.0 1.0 1.0 1.0 1.0 1.0 0.5 1.0 1.0 1.0 1.0 1.0 0.5 0.5 1.0 1.0 0.5 1.0
##  [109] 0.5 0.5 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [127] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [145] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [163] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
pwilcox(df$Deceased, m=1, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [55] 0.5 0.5 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [73] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 1.0 0.5 0.5 0.5 0.5
##   [91] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [109] 0.5 0.5 0.5 0.5 0.5 1.0 0.5 1.0 1.0 0.5 0.5 1.0 1.0 1.0 1.0 0.5 1.0 0.5
##  [127] 1.0 0.5 1.0 0.5 1.0 0.5 1.0 1.0 1.0 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5
##  [145] 0.5 1.0 0.5 0.5 0.5 0.5 0.5 1.0 1.0 1.0 0.5 0.5 0.5 0.5 1.0 0.5 0.5 0.5
##  [163] 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
qwilcox(df$Confirmed, m=1, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qwilcox(df$Confirmed, m = 1, n = 1, lower.tail = TRUE, log.p =
## FALSE): NaNs produced
```

```
##   [1]   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0   1 NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN   1 NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0   1 NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
rwilcox(df$Confirmed, m=1, n=1)
```

```
##   [1] 0 1 0 0 1 1 1 0 1 0 1 0 0 0 0 0 1 1 1 1 1 0 0 0 1 0 1 1 0 1 0 1 1 0 1 1 0
##  [38] 1 0 1 1 1 1 1 1 1 1 0 0 0 1 0 0 1 1 1 1 0 1 1 0 1 0 0 1 1 1 1 0 1 1 0 0 1
##  [75] 0 0 0 1 1 1 0 1 0 0 1 0 0 1 1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 1 1 1 0 0 1 1 1
## [112] 0 1 0 0 0 1 1 1 0 1 1 1 1 1 0 0 0 0 1 1 1 0 1 1 0 0 1 1 1 1 0 0 1 0 0 1 1
## [149] 1 0 1 0 1 1 0 0 1 0 1 1 0 0 1 0 1 1 0 1 1 0 1 0 0 1 0 0 0 1 1 1 1 1 1 0 0
## [186] 1 0 1 0 0 1 0 1 1 1 1 1 1 1 0 1 1 1 0 1 1 0 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0
## [223] 0 1 1 0 0 0 0 0 1 1 1 1 1 0 1 1 0 1 1 0 0 1 0 1 0 0 1 1 1 0 1 0 0 0 1 1 0
## [260] 0 0 0 0 1 0 1 1 1 1 1 0 0 0 1 1 0 0 0 1 0 0 1 1 1 1 1 1 1 0 1 0 1 0 0 0 1
## [297] 0 1 0 0 1 1 0 0 1 1 1 1 0 0 0 0 1 0 0 1 0 1 1 1 0 1 1 0 1 1 1 0 1 0 0 0 1
## [334] 0 1 0 0 1 1 0 0 1 0 0 0 0 0 1 0 0 1 1 0 1 0 0 1 0 1 1 1 1 1 0 1 0 1 1 0 0
## [371] 1 0 0 1 1 0 1 0 0 1 0 1 1 1 1 0 1 1 1 1 1 0 0 1 1 0 1 1 0 1 1 1 1 1 1 0 1
## [408] 0 0 1 0 0 0 1 1 0 1 0 0 0 1 0 0 0 1 1 0 0 1 0 1 1 1 1 0 1 0 1 0 1 0 0 1 1
## [445] 0 1 1 1 1 0 0 0 0 1 0 1 1 1 0 0 1 1 1 0 0 0 1 1 0 0 0 1 0 0 1 1 1 1 0 1 0
## [482] 0 0 0 0 1 0 1 1 0 1 1 0 1 0 1 1 1 0 1 0 0 1 1 0 1 0 1 0 1 0 0 0 0 1 1 0 1 1 1
## [519] 1 0 0 0 1 1 0 0 1 0 1 1 0 1 0 0 1 1 1 0 0 0 0 0 1 0 1 0 0 0 0 0 1 1
```

```
rwilcox(df$Recovered, m=1, n=1)
```

```
##   [1] 0 0 1 1 0 1 1 0 1 0 0 0 1 1 0 1 0 1 0 1 0 1 0 0 1 1 0 1 1 0 0 0 0 1 1 0 1 1 0
##  [38] 1 1 1 0 1 1 1 0 1 1 0 1 0 0 0 0 1 0 0 1 1 1 1 1 1 0 0 0 1 1 0 1 0 0 0 0 1
##  [75] 1 1 1 1 0 0 1 0 0 1 1 1 0 0 1 1 0 1 1 1 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 1 1
## [112] 1 0 1 1 1 0 1 0 0 1 0 0 1 1 0 1 0 0 1 0 1 1 1 1 0 0 1 0 1 1 0 0 0 0 1 1 0
## [149] 1 1 1 1 0 1 0 0 0 0 0 1 0 1 1 1 1 1 0 0 0 0 0 0 1 0 0 1 0 1 1 1 1 1 0 1 1
## [186] 1 1 1 0 0 0 1 1 0 1 1 0 0 0 0 1 1 0 1 0 0 1 0 1 1 0 1 0 1 0 0 0 1 0 1 1 1
## [223] 1 1 1 0 0 0 0 0 1 1 0 0 1 0 1 1 1 1 0 1 0 0 0 1 1 1 1 0 1 0 1 1 1 1 0 1 1
## [260] 1 0 0 0 0 1 0 1 1 0 1 1 0 0 1 1 1 1 0 0 1 1 0 1 0 0 0 0 0 0 1 0 1 0 1 1 0
## [297] 1 1 1 0 0 0 1 1 0 1 1 1 0 1 1 1 1 1 0 1 1 0 0 0 1 0 0 1 0 0 0 1 0 1 1 0 1
## [334] 1 1 1 1 0 0 0 0 0 1 1 1 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 0 0 1 1 1 0 0 1
## [371] 0 0 0 1 1 0 0 0 1 1 0 0 0 1 1 0 1 1 1 0 0 0 1 1 1 1 1 1 0 1 0 1 1 0 0 1 0
## [408] 1 1 1 0 0 1 1 1 0 1 0 1 1 1 0 0 0 0 1 1 1 1 0 1 1 0 0 0 1 1 1 1 0 0 1 0 0
## [445] 0 0 0 1 1 1 0 1 0 1 0 0 1 0 0 0 1 1 0 1 0 1 1 1 0 0 0 1 0 0 1 1 0 0 0 1 1
## [482] 0 0 1 1 1 1 1 0 0 0 0 0 0 0 1 0 1 0 0 0 0 1 0 0 0 1 1 1 0 0 1 0 0 1 0 1 1 1
## [519] 0 0 1 0 0 0 1 0 0 0 0 0 0 0 1 1 1 0 1 1 0 1 1 1 0 1 0 0 0 1 0 0 0 1 1
```

```
rwilcox(df$Deceased, m=1, n=1)
```

```
##   [1] 1 0 1 0 0 0 0 1 0 1 1 1 0 1 0 0 0 0 1 1 1 0 1 1 0 1 1 0 1 1 0 0 0 0 0 0 0 1 0 0
##  [38] 1 0 1 1 0 1 1 1 0 0 0 1 1 0 0 1 0 1 0 1 1 1 0 1 1 0 0 1 0 1 0 1 1 1 1 1 1
##  [75] 0 1 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 1 0 0 1 0 0 0 1 0 1 0 0 0 1 1 1 1 1 1 1
## [112] 1 0 1 1 1 1 0 0 0 1 0 0 0 0 1 0 1 0 1 1 1 0 0 1 0 1 0 1 1 0 1 0 1 0 0 1 1
## [149] 1 0 0 1 1 1 1 1 0 0 0 1 1 1 1 1 0 0 0 0 1 0 1 1 0 1 0 0 1 0 1 0 1 0 0 0 0
## [186] 0 1 1 1 0 1 1 1 1 0 0 0 0 1 1 0 1 1 0 1 0 1 1 1 0 0 1 0 0 1 1 1 0 0 0 0 1
## [223] 1 0 0 1 1 1 1 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1 0 1 0 0 1 0 1 0 0 0 0 0 1 0 1
## [260] 1 1 1 1 0 0 0 0 1 0 0 0 0 1 0 0 1 0 0 0 1 1 1 1 0 0 1 0 1 0 1 0 1 0 0 0 1
## [297] 0 1 1 0 1 0 1 0 0 1 0 1 0 0 0 0 0 0 0 1 1 1 0 1 1 0 1 0 1 1 0 0 0 1 1 1
## [334] 1 0 1 0 1 0 0 1 0 1 0 1 0 1 0 1 1 0 0 1 1 0 1 0 1 1 1 0 1 0 0 0 0 1 0 1 0 0 0
## [371] 1 0 1 0 0 1 1 1 0 0 0 0 1 0 0 1 0 1 1 0 1 1 1 1 1 0 1 1 0 0 0 1 0 0 1 0 0
## [408] 0 0 0 1 1 1 1 0 0 1 1 0 1 1 0 0 0 0 1 0 1 0 0 0 0 1 0 1 0 0 0 1 1 1 0 1
## [445] 1 0 1 1 1 1 1 1 0 0 0 0 1 0 1 1 1 1 0 1 0 0 0 1 0 1 0 0 1 1 1 0 0 0 1 0 0
## [482] 1 0 0 0 0 0 1 1 0 0 0 1 1 1 1 0 1 0 1 1 1 0 1 0 1 0 1 0 1 1 1 0 1 0 0 1 0 1 0
## [519] 0 0 1 0 0 1 1 1 0 0 1 0 1 0 0 0 1 0 1 1 1 1 0 1 1 0 1 0 1 1 1 0 0 0
```

```
dsignrank(df$Confirmed, n=1, log = FALSE)
```

```
##    [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [37] 0.5 0.5 0.5 0.0 0.0 0.5 0.0 0.0 0.5 0.0 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0
##   [55] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##   [73] 0.0 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##   [91] 0.0 0.0 0.5 0.0 0.5 0.5 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [109] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [127] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [145] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [163] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [181] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
dsignrank(df$Recovered, n=1, log = FALSE)
```

```
##    [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [55] 0.5 0.5 0.5 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##   [73] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0
##   [91] 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.0 0.0 0.0 0.0 0.5 0.0 0.5 0.5 0.5 0.0 0.5 0.0
##  [109] 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [127] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [145] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [163] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [181] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
##  [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
dsignrank(df$Deceased, n=1, log = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [73] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [91] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [109] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [127] 0.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [145] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.0 0.5 0.5 0.5
## [163] 0.5 0.0 0.0 0.0 0.5 0.5 0.0 0.5 0.0 0.0 0.5 0.5 0.5 0.0 0.0 0.0 0.0 0.0
## [181] 0.0 0.5 0.0 0.0 0.0 0.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [199] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [217] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [235] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [253] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [271] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [289] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [307] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [325] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [343] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [361] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [379] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [397] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [415] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [433] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [451] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [469] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [487] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [505] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [523] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
## [541] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
```

```r
psignrank(df$Confirmed, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.5 0.5 0.5 1.0 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 1.0 1.0 0.5 1.0 1.0 0.5 1.0 1.0 0.5 0.5 1.0 1.0 1.0 1.0 1.0
##  [55] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [73] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [91] 1.0 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [109] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [127] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
## [145] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [163] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
psignrank(df$Recovered, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
##    [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##   [55] 0.5 0.5 0.5 1.0 1.0 1.0 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##   [73] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##   [91] 1.0 1.0 1.0 1.0 1.0 1.0 0.5 1.0 1.0 1.0 1.0 1.0 0.5 0.5 1.0 1.0 0.5 1.0
##  [109] 0.5 0.5 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [127] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [145] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [163] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
##  [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
psignrank(df$Deceased, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
##   [1] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [19] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [37] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [55] 0.5 0.5 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
##  [73] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 1.0 0.5 0.5 0.5 0.5
##  [91] 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
## [109] 0.5 0.5 0.5 0.5 0.5 1.0 0.5 1.0 1.0 0.5 0.5 1.0 1.0 1.0 1.0 0.5 1.0 0.5
## [127] 1.0 0.5 1.0 0.5 1.0 0.5 1.0 1.0 1.0 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5
## [145] 0.5 1.0 0.5 0.5 0.5 0.5 0.5 1.0 1.0 1.0 0.5 0.5 0.5 0.5 1.0 0.5 0.5 0.5
## [163] 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [181] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [199] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [217] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [235] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [253] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [271] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [289] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [307] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [325] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [343] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [361] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [379] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [397] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [415] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [433] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [451] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [469] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [487] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [505] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [523] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
## [541] 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
```

```r
qsignrank(df$Confirmed, n=1, lower.tail = TRUE, log.p = FALSE)
```

```
## Warning in qsignrank(df$Confirmed, n = 1, lower.tail = TRUE, log.p = FALSE):
## NaNs produced
```

```
##   [1]   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [19]   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
##  [37]   0   0   0 NaN NaN   0 NaN NaN   0 NaN NaN   0   0   1 NaN NaN NaN NaN
##  [55] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [73] NaN NaN NaN NaN   1 NaN   1 NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
##  [91] NaN NaN   0 NaN   0   0 NaN   0   0   1 NaN NaN NaN NaN NaN NaN NaN NaN
## [109] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [127] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [145] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [163] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [181] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [199] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [217] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [235] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```
## [253] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [271] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [289] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [307] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [325] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [343] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [361] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [379] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [397] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [415] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [433] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [451] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [469] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [487] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [505] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [523] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
## [541] NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
```

```r
rsignrank(df$Confirmed, n=1)
```

```
##   [1] 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 1 0 0 1 1 1 0 1 1 0 1 0 1 0 0 0 1 0
##  [38] 0 1 1 0 1 1 0 0 1 0 1 1 1 1 1 1 0 1 0 0 1 1 0 0 1 1 0 0 0 1 0 0 1 1 0 1 0
##  [75] 0 1 1 0 0 0 1 1 0 0 1 0 0 1 0 1 1 0 0 1 1 1 1 1 0 0 1 1 1 0 0 0 1 0 1 0 0
## [112] 0 1 1 0 0 0 0 1 0 1 0 1 1 1 0 1 0 0 1 1 1 1 1 0 1 1 0 0 1 0 1 1 1 0 0 1 0
## [149] 0 1 1 0 1 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 1 0 1 0 1 0 1 0 1 0 1 1 0
## [186] 1 1 0 1 0 0 0 1 1 0 0 1 0 0 0 1 1 0 1 0 1 1 1 0 0 1 1 1 1 1 1 0 1 0 1 0 1
## [223] 1 0 1 1 1 1 0 0 1 1 1 0 1 1 1 0 1 0 0 1 1 1 0 1 0 0 0 0 1 1 1 1 1 0 1 1
## [260] 1 1 0 0 1 0 1 1 0 0 0 0 0 0 1 1 0 1 0 1 0 0 0 1 1 0 1 1 1 0 1 1 0 1 1 1 1
## [297] 0 1 1 1 0 1 1 1 1 1 0 1 0 1 0 0 1 1 1 1 0 0 0 1 0 1 1 1 1 0 0 1 0 1 1 0 0
## [334] 0 0 0 0 1 0 0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 1 1 0 1 0 0 1 1 0 1 0 1 1 0 1 0
## [371] 1 0 1 1 1 1 1 1 0 0 1 1 0 1 1 1 1 0 1 0 1 1 1 0 0 0 1 1 0 0 0 0 1 1 0 1 1
## [408] 1 1 1 0 0 0 1 0 0 0 1 1 0 1 0 0 0 1 0 0 1 1 1 1 1 0 0 0 1 1 0 1 0 0 1 1 1
## [445] 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 1 1 0 1 0 0 0 1 1 1 0 1 0 1 0 1 0 1 1 1 1 0
## [482] 0 0 1 0 1 1 0 1 1 0 0 1 1 1 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 1 1 0 1 0 1
## [519] 1 0 0 0 0 0 1 1 0 0 0 1 1 1 0 0 0 1 1 0 1 1 0 0 0 1 0 1 1 0 1 1 1 1
```

```r
rsignrank(df$Recovered, n=1)
```

```
##   [1] 1 1 0 0 1 0 1 0 1 1 1 1 0 1 0 1 0 1 0 1 0 1 1 1 1 1 0 0 1 1 1 0 0 1 0 1 1 0
##  [38] 0 1 0 1 1 0 1 1 1 1 0 0 0 1 0 0 1 1 0 1 0 0 1 1 1 1 1 1 1 0 1 1 1 0 1 0 0
##  [75] 1 0 0 1 0 0 1 1 1 1 0 1 0 1 0 0 1 0 1 0 0 0 0 1 1 0 1 0 0 1 1 1 0 0 1 1 1
## [112] 1 0 0 0 0 1 1 1 0 1 0 0 1 0 1 1 1 1 0 0 0 1 1 1 1 1 0 1 0 0 0 1 0 0 1 1 0
## [149] 0 1 0 0 1 0 1 1 0 1 0 0 0 1 1 1 1 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 0 1 1 1
## [186] 1 0 1 1 1 0 0 0 0 0 0 0 0 0 1 0 0 1 0 1 1 1 1 1 0 1 0 0 1 0 0 0 1 0 0 1
## [223] 1 1 1 0 1 0 1 0 0 1 0 1 1 1 1 0 1 0 0 1 1 1 1 1 1 0 0 0 0 1 1 0 0 0 1 1 1
## [260] 0 0 0 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 1 1 0 1 0 1 1 1 1 1 1 0 0 1 1 0 1 1 1
## [297] 0 1 0 1 1 0 1 1 1 0 0 1 0 1 1 1 0 0 0 1 0 0 1 1 0 1 0 0 1 0 1 0 1 1 0 0 1
## [334] 1 1 1 0 1 0 1 1 0 1 1 0 1 1 0 0 0 1 0 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 1 0 0
## [371] 0 0 1 1 1 1 0 1 1 0 1 1 1 1 1 0 0 1 1 0 1 1 0 1 0 1 0 1 0 1 0 1 0 0 0 1 1 1 0 0
## [408] 0 1 1 0 0 0 0 1 1 1 0 0 0 0 0 1 0 0 1 1 0 1 0 1 0 0 1 1 1 1 0 0 1 0 1 0 1
## [445] 0 1 0 0 0 0 1 0 1 0 0 0 1 0 0 1 0 0 1 0 0 0 1 0 1 1 0 0 1 1 0 1 1 0 0 0 1
## [482] 0 1 0 1 0 1 0 1 0 0 0 0 1 1 0 0 0 1 0 1 1 1 0 1 0 0 0 1 0 0 1 1 1 1 0 0 0
## [519] 0 1 0 0 0 1 0 0 1 1 1 1 1 1 0 0 0 0 0 0 1 0 1 1 0 1 0 0 0 1 0 1 0 1
```

```r
rsignrank(df$Deceased, n=1)
```

```
##    [1] 0 0 1 1 0 1 1 0 0 1 1 0 1 1 0 1 0 0 0 0 1 0 1 0 0 1 0 0 1 1 1 0 0 1 1 0 1
##   [38] 1 0 1 1 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 1 0 0 1 0 1 1 1 1 0 0 1 0 0 0 1 0 0
##   [75] 0 1 1 0 0 0 0 0 1 0 0 1 1 0 0 1 0 1 1 1 1 0 1 0 0 1 1 1 0 0 1 0 1 0 0 1 1
##  [112] 0 0 1 1 1 1 0 0 1 1 0 1 1 1 1 0 1 0 1 0 0 0 0 1 0 0 0 1 1 0 1 0 1 0 1 0 0
##  [149] 0 0 0 1 1 0 1 1 0 0 0 0 0 0 0 0 1 1 1 0 0 1 1 0 0 0 1 0 1 1 0 1 0 0 0 0 0
##  [186] 1 0 0 0 0 0 1 0 1 1 0 1 0 1 0 1 0 1 1 0 1 0 0 0 0 0 1 1 0 0 1 0 0 1 0 0 1
##  [223] 1 1 0 0 1 0 1 0 1 1 0 0 1 0 1 0 0 0 1 0 1 0 1 1 1 1 0 1 0 1 1 0 0 0 0 1 0
##  [260] 0 1 0 1 0 0 0 0 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 0 0 0 0 0 0 0 1 1 1 1 0 1
##  [297] 1 0 1 0 1 0 1 0 1 0 1 1 0 0 0 0 1 0 0 0 1 1 1 1 1 0 0 1 1 1 0 0 1 1 0 0 1
##  [334] 1 1 1 1 0 1 1 0 1 0 1 0 0 0 0 0 1 0 0 0 0 1 1 0 0 1 0 0 1 0 0 0 0 0 1 1 0
##  [371] 0 1 0 0 1 1 0 1 0 0 1 0 1 0 0 1 1 0 1 0 1 0 1 1 0 0 1 1 0 1 1 0 0 0 1 0 1
##  [408] 1 1 1 0 0 0 0 0 0 1 1 1 0 1 0 1 0 1 0 0 1 0 0 0 0 1 0 1 1 0 0 0 1 0 1 1 1
##  [445] 0 1 1 1 0 1 0 1 1 0 0 1 1 1 0 0 0 0 0 1 1 0 0 1 0 0 0 1 0 0 0 1 1 1 1 0 1
##  [482] 1 1 1 1 1 1 1 1 1 1 1 0 0 1 0 1 0 0 1 1 0 0 0 1 1 0 1 0 0 1 1 1 0 0 0 1 0 1
##  [519] 1 0 1 0 1 0 0 1 1 0 1 1 0 0 0 0 0 1 1 0 1 0 0 1 0 0 1 1 0 0 1 0 1 0
```

```r
boxplot(df$Confirmed,
        main = "Covid-19 Cases in Kerala",
        xlab = "Boxplot",
        ylab = "Confirmed cases",
        col = "orange",
        border = "brown",
        horizontal = TRUE,
        notch = TRUE)
```

Covid–19 Cases in Kerala
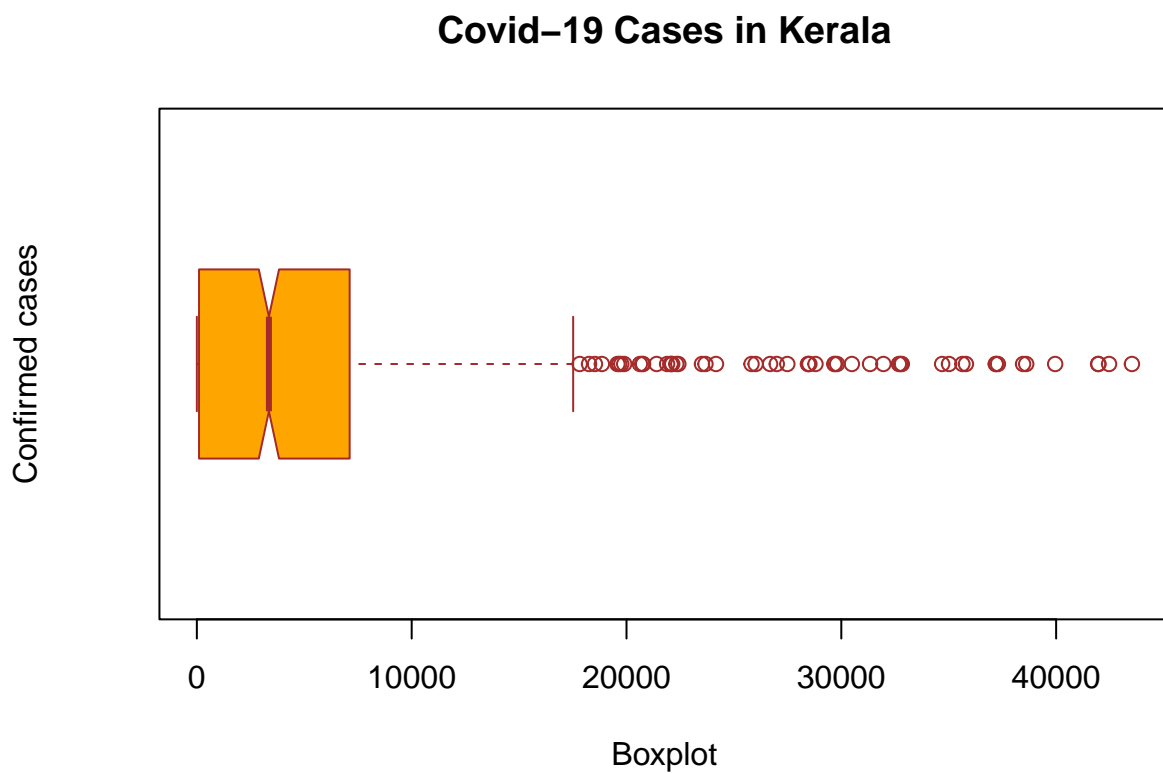

```r
boxplot(df$Recovered,
        main = "Covid-19 Cases in Kerala",
```

```
        xlab = "Boxplot",
        ylab = "Recovered cases",
        col = "Blue",
        border = "brown",
        horizontal = TRUE,
        notch = TRUE)
```

Covid−19 Cases in Kerala
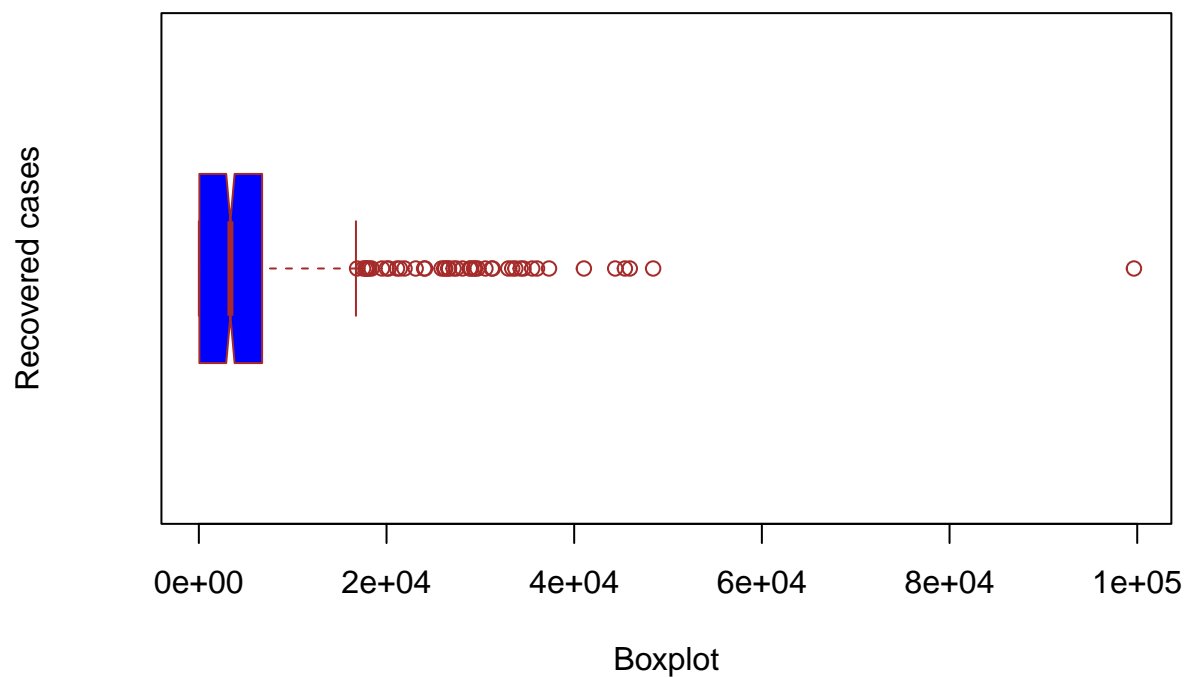

```
boxplot(df$Deceased,
        main = "Covid-19 Cases in Kerala",
        xlab = "Boxplot",
        ylab = "Deceased cases",
        col = "black",
        border = "brown",
        horizontal = TRUE,
        notch = TRUE)
```

Covid−19 Cases in Kerala
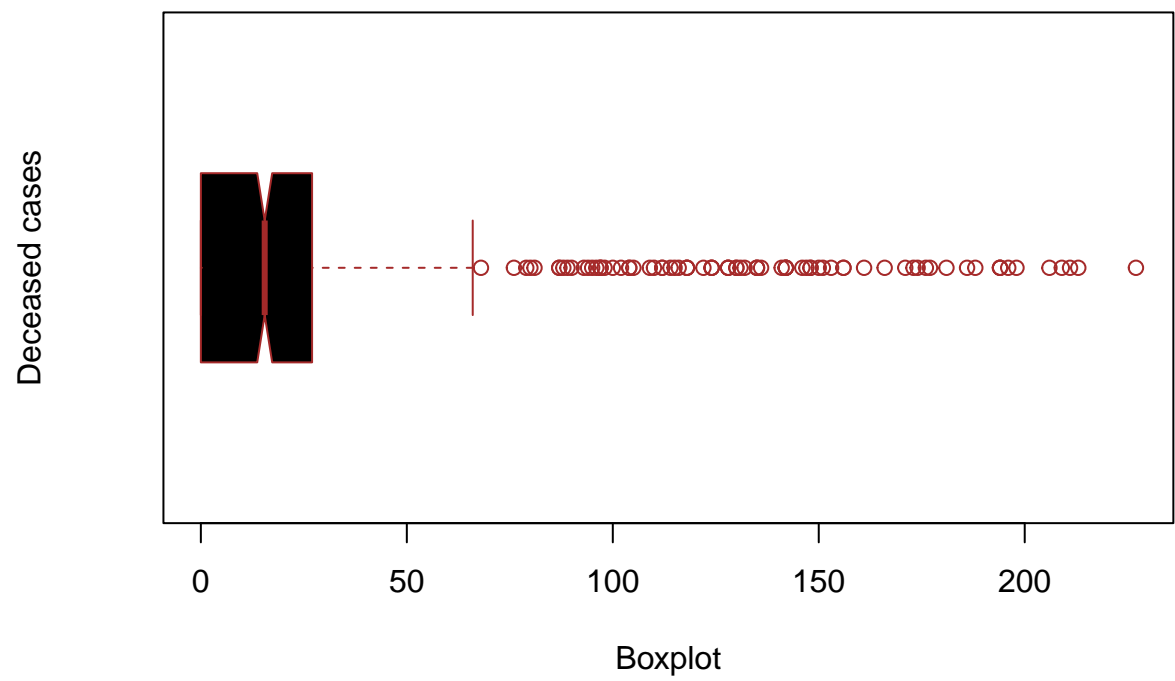

```
hist(df$Confirmed)
```

Histogram of df$Confirmed
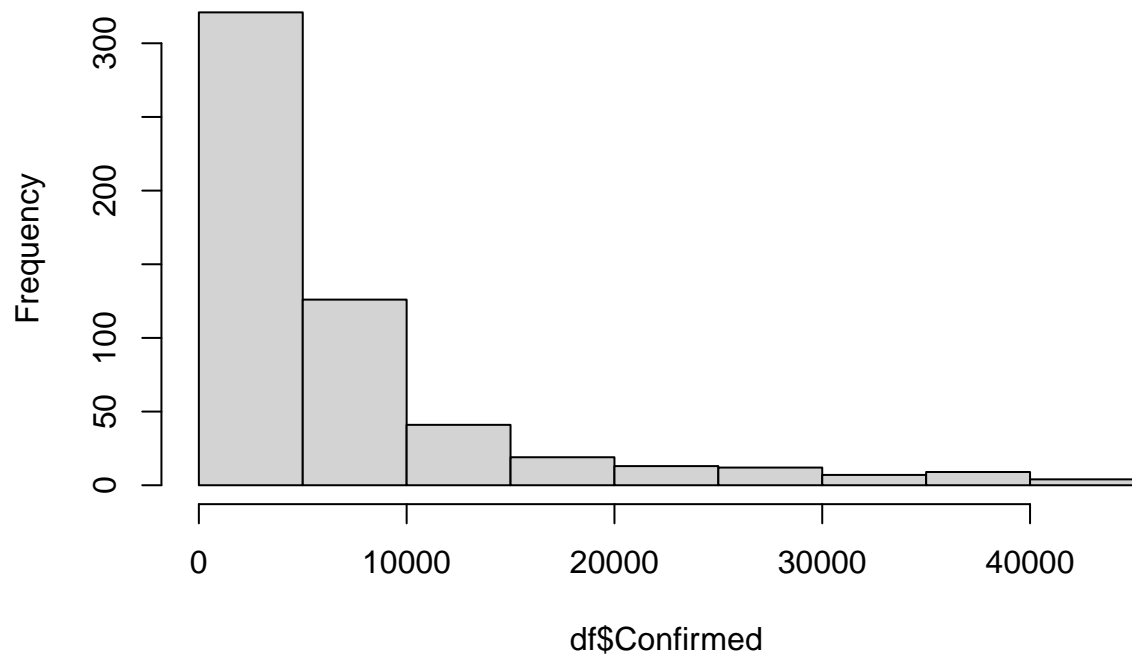

```
hist(df$Recovered)
```

Histogram of df$Recovered
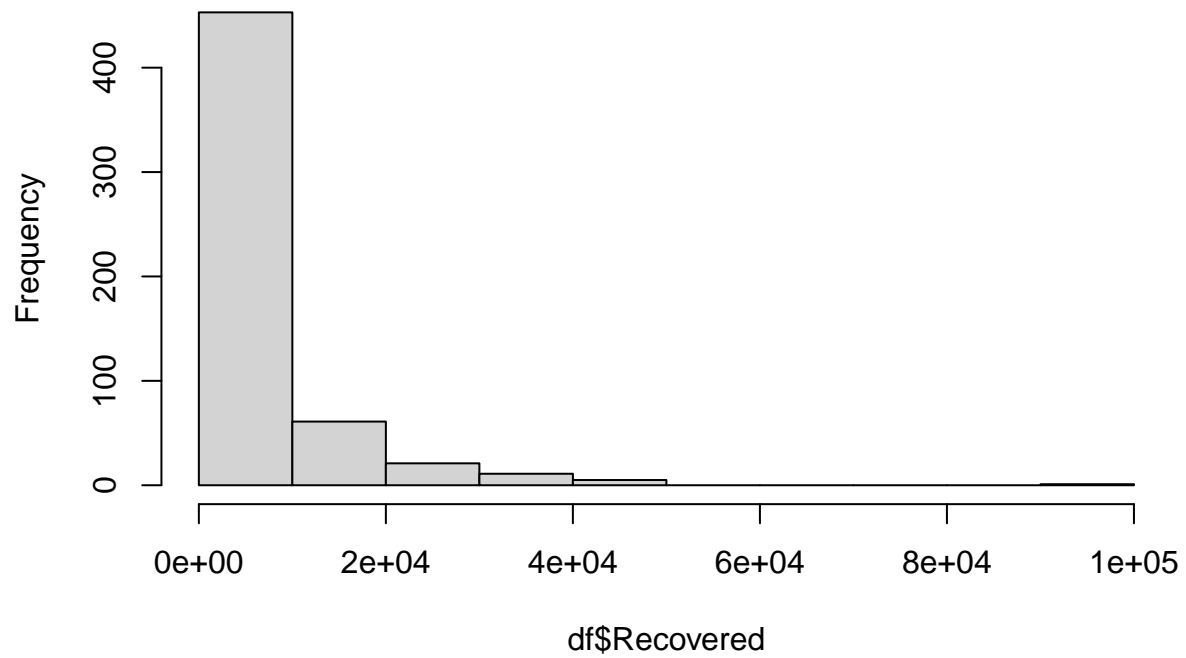

```
hist(df$Deceased)
```

Histogram of df$Deceased
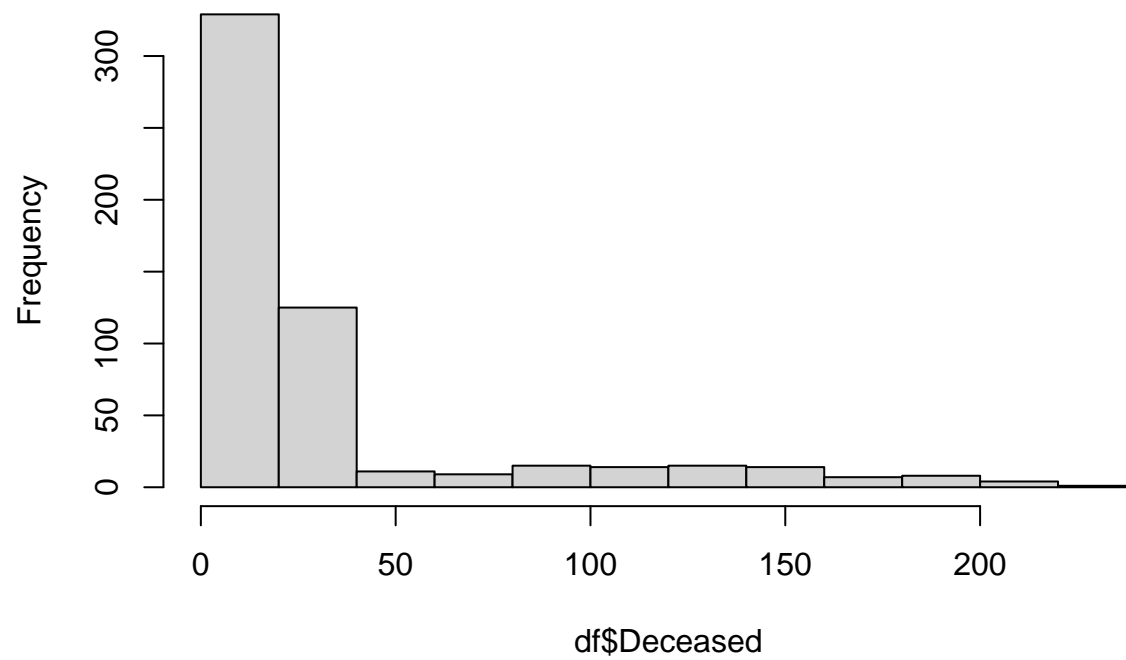

```
plot(density(df$Confirmed))
```

density.default(x = df$Confirmed)

N = 552   Bandwidth = 1323
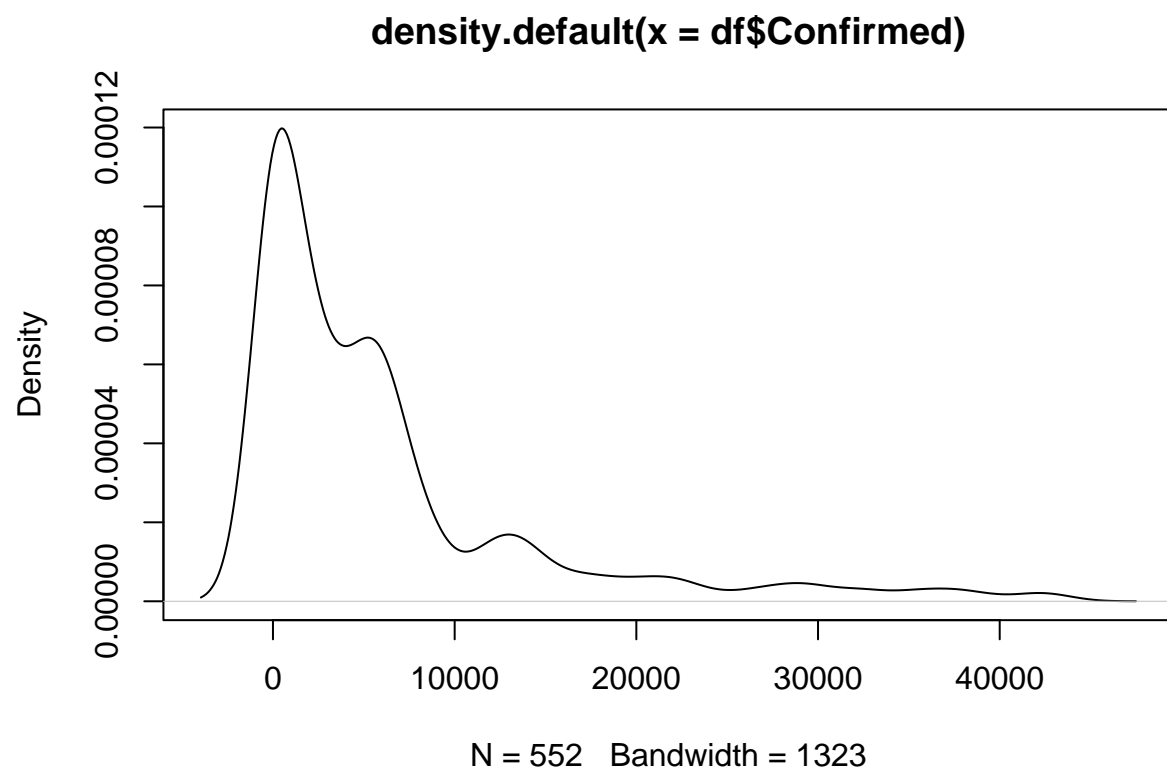
```
plot(density(df$Recovered))
```

density.default(x = df$Recovered)
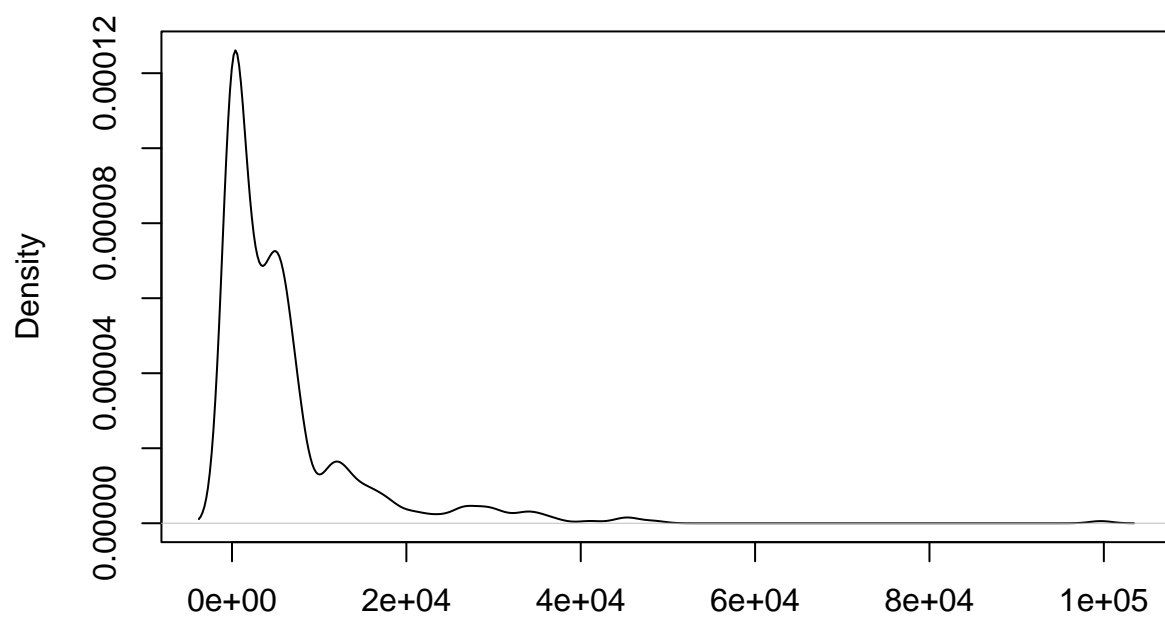
N = 552   Bandwidth = 1268

```
plot(density(df$Deceased))
```

density.default(x = df$Deceased)

N = 552   Bandwidth = 5.13
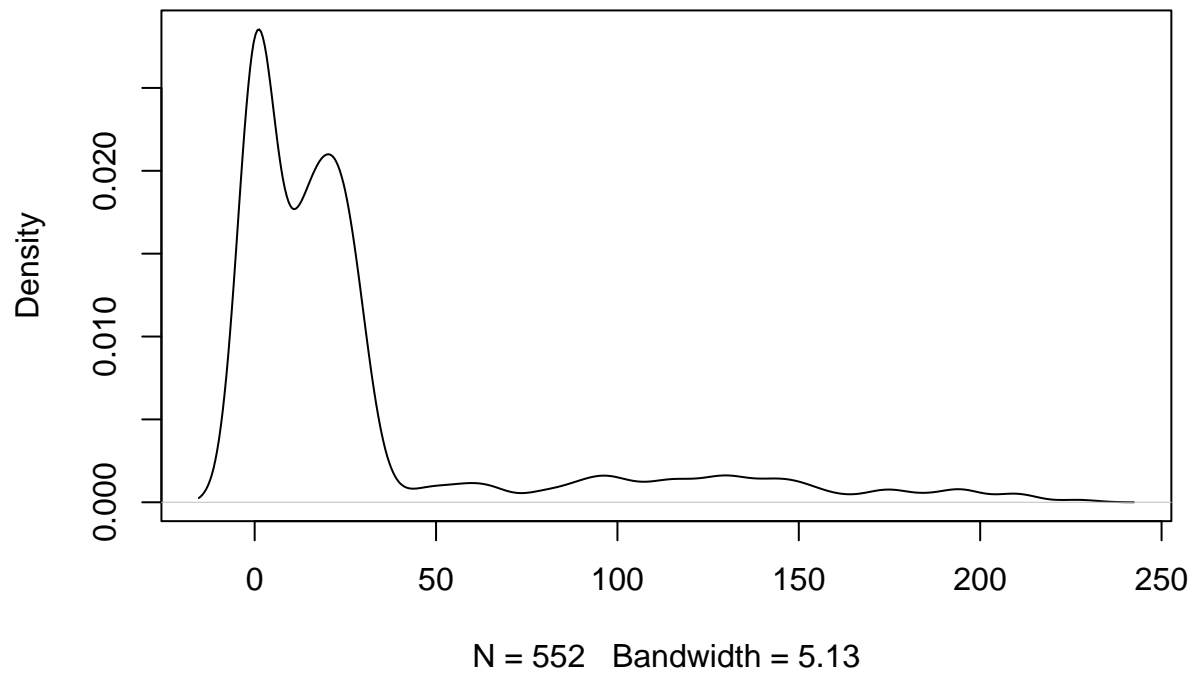
```
boxplot(df$Confirmed,df$Recovered)
```
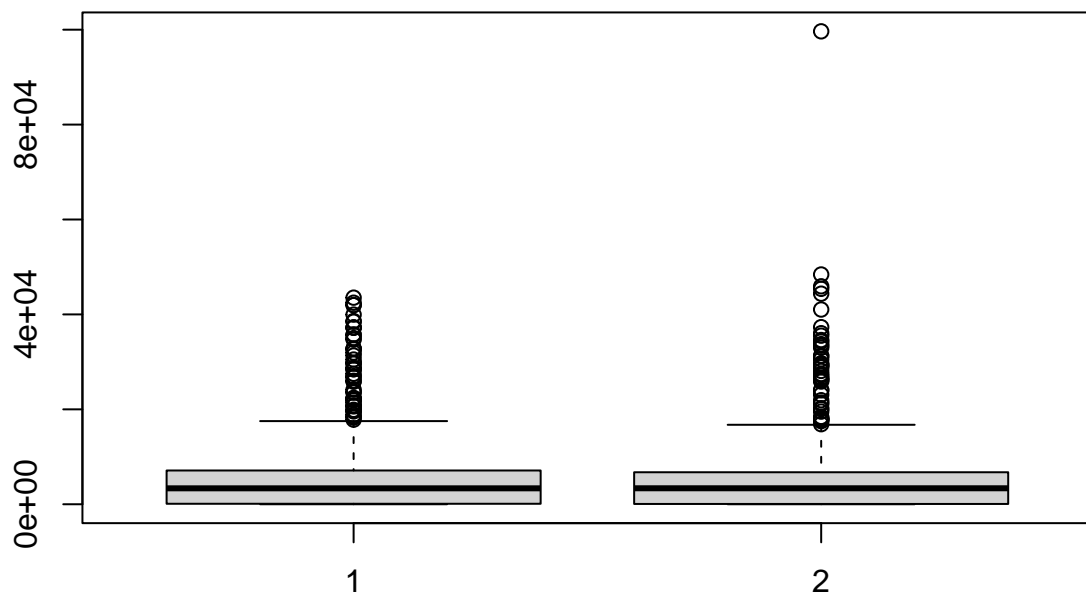
```
boxplot(df$Confirmed,df$Deceased)
```
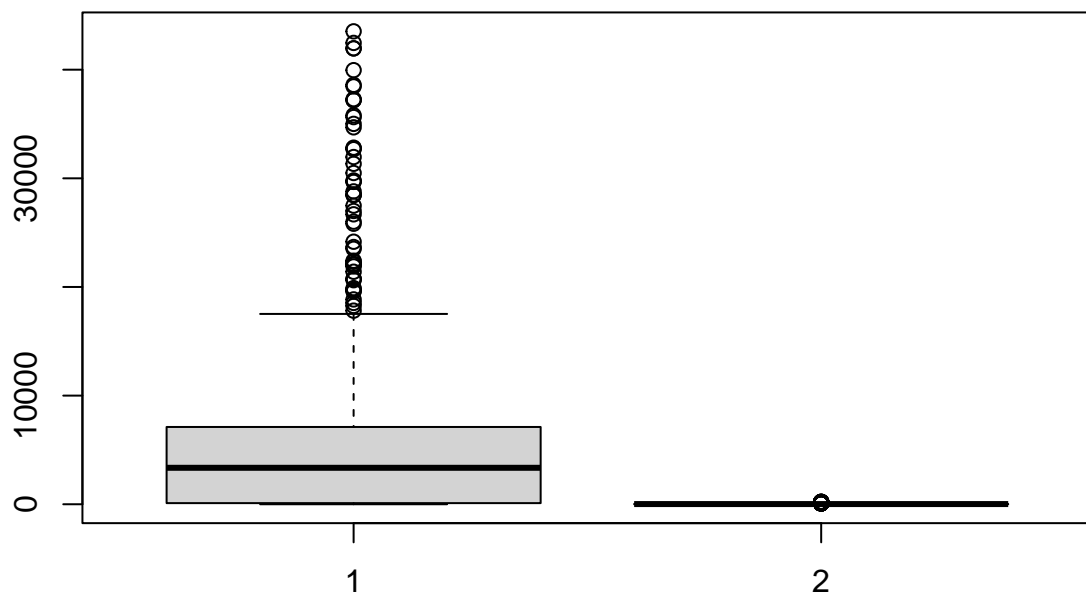
```
boxplot(df$Deceased,df$Recovered)
```
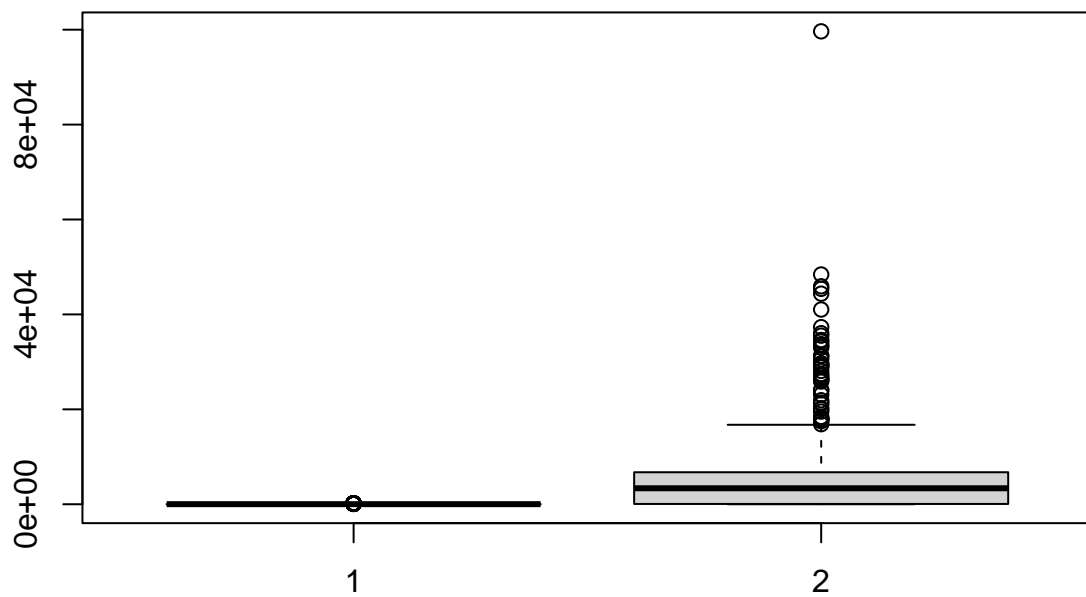
```
boxplot(df$Deceased,df$Confirmed)
```
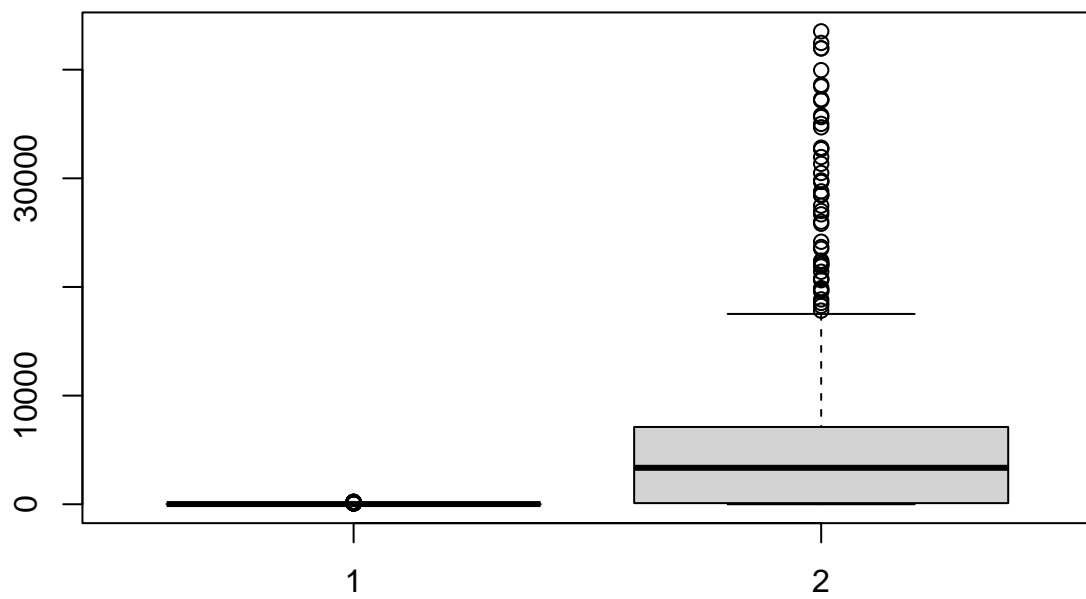
```
boxplot(df$Recovered,df$Confirmed)
```
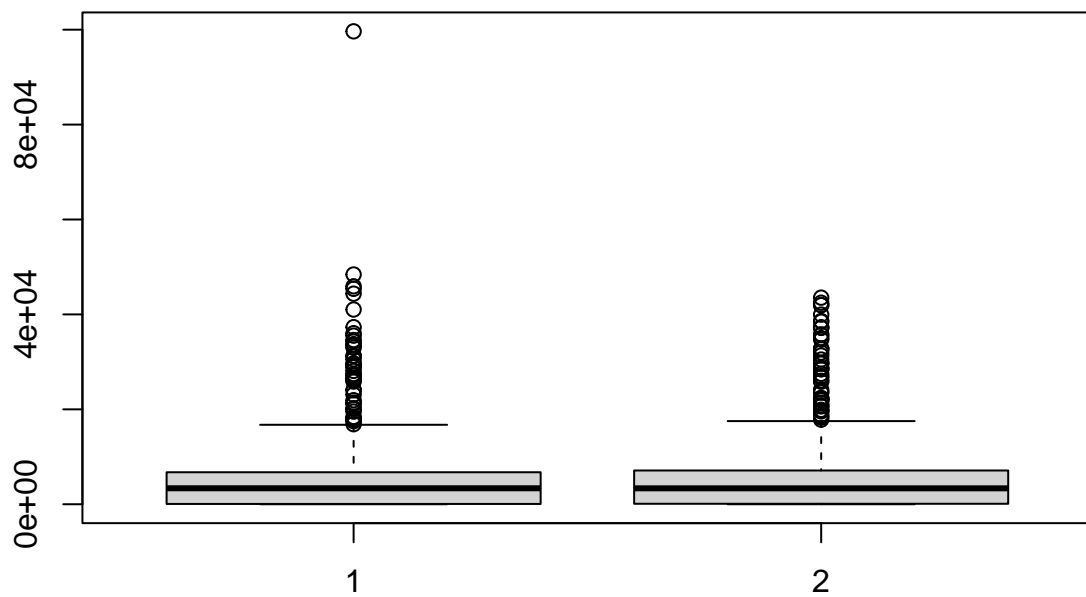
```
boxplot(df$Recovered,df$Deceased)
```
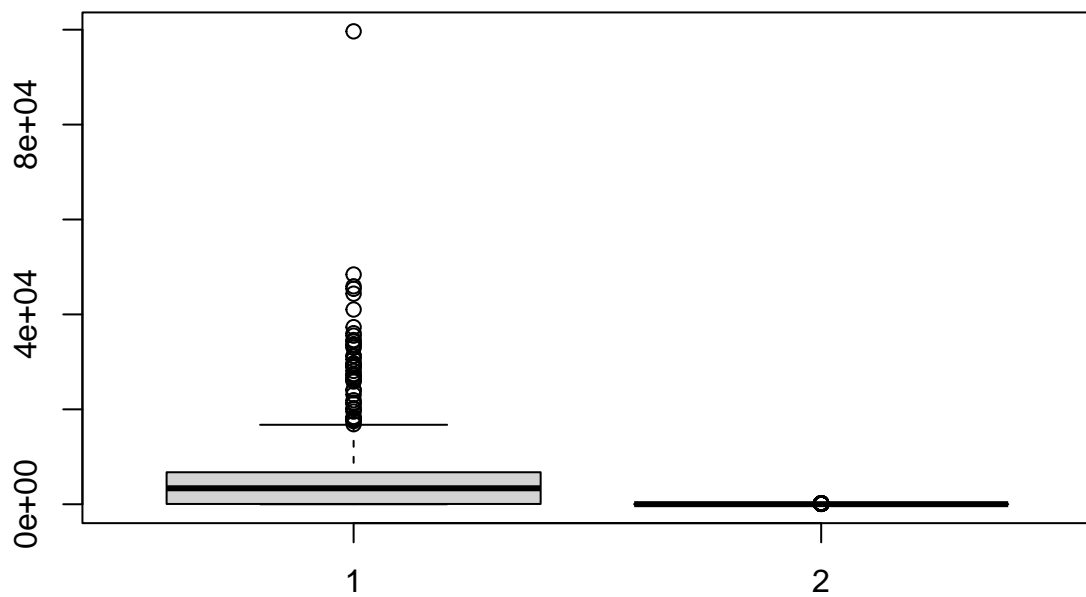
```
plot(df$Confirmed,df$Recovered,pch=25)
```
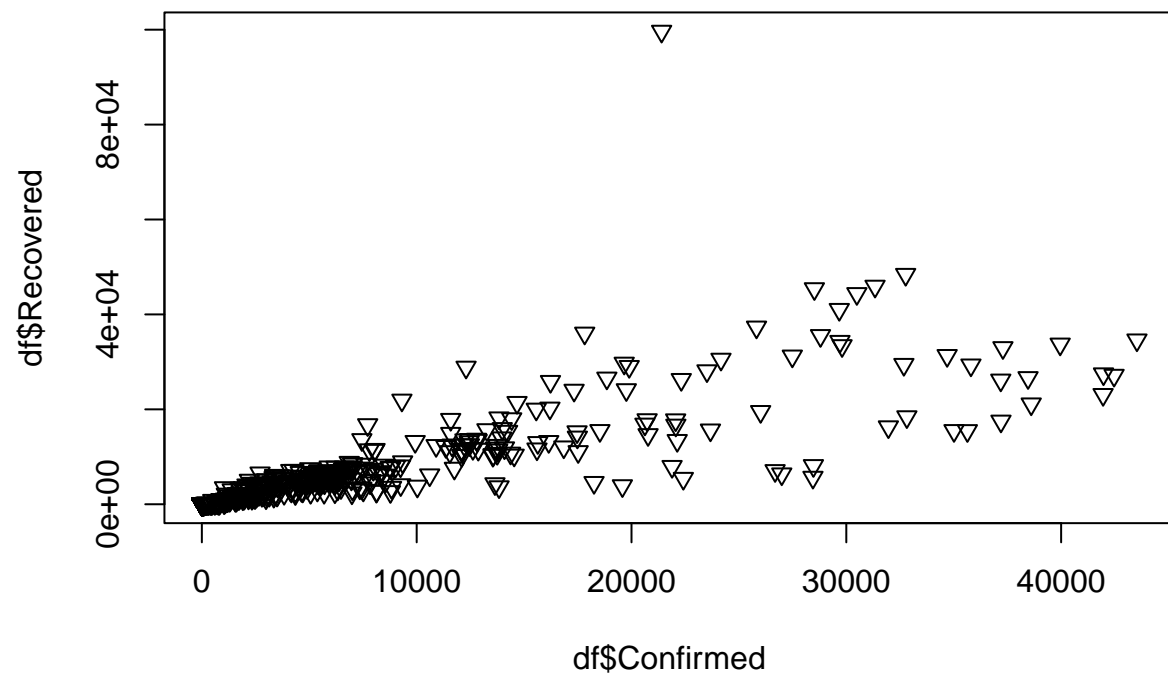
```
plot(df$Recovered,df$Confirmed,pch=25)
```
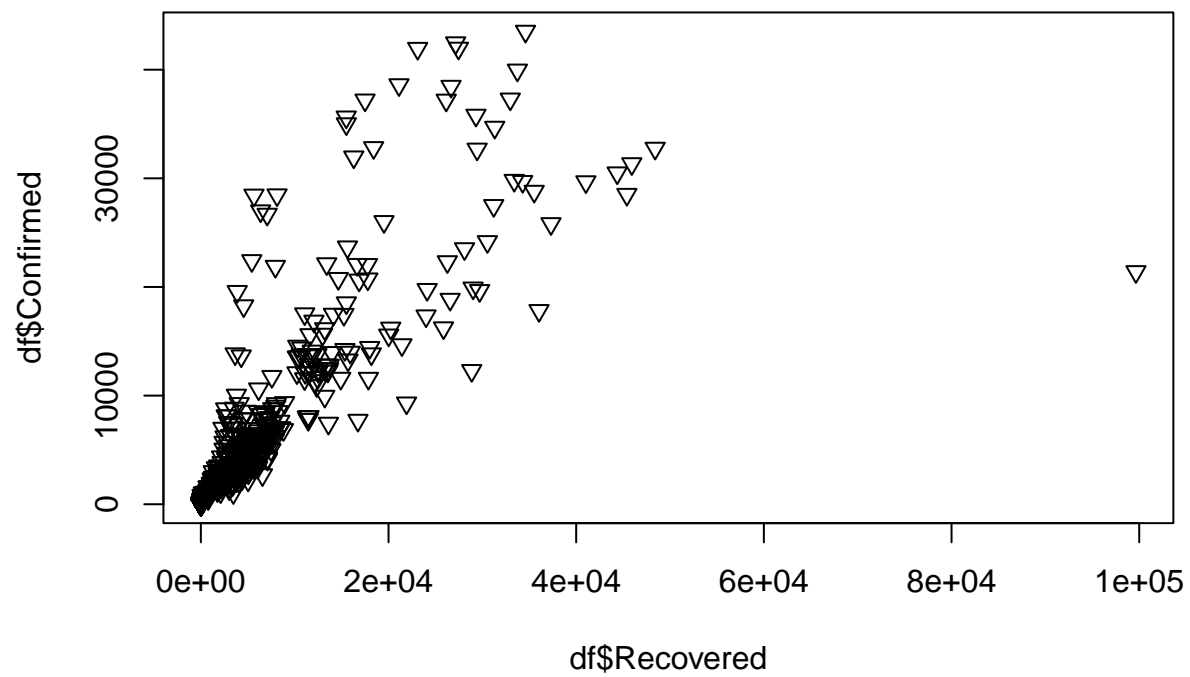
```
plot(df$Confirmed,df$Deceased,pch=25)
```
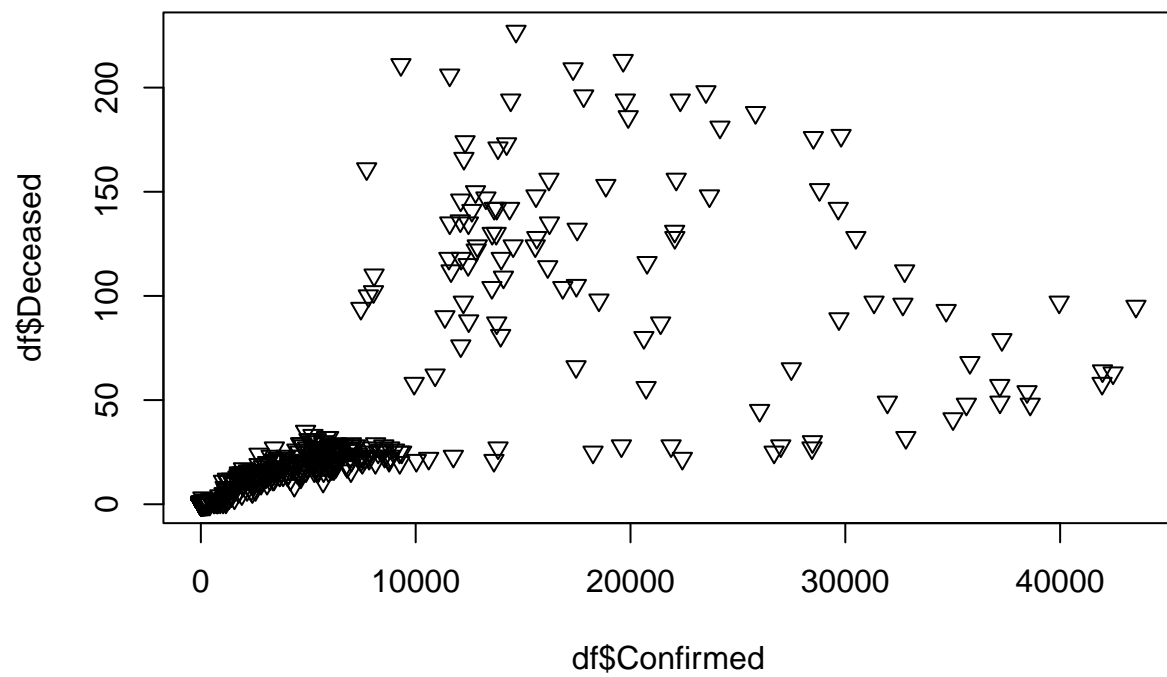
```
plot(df$Recovered,df$Deceased,pch=25)
```
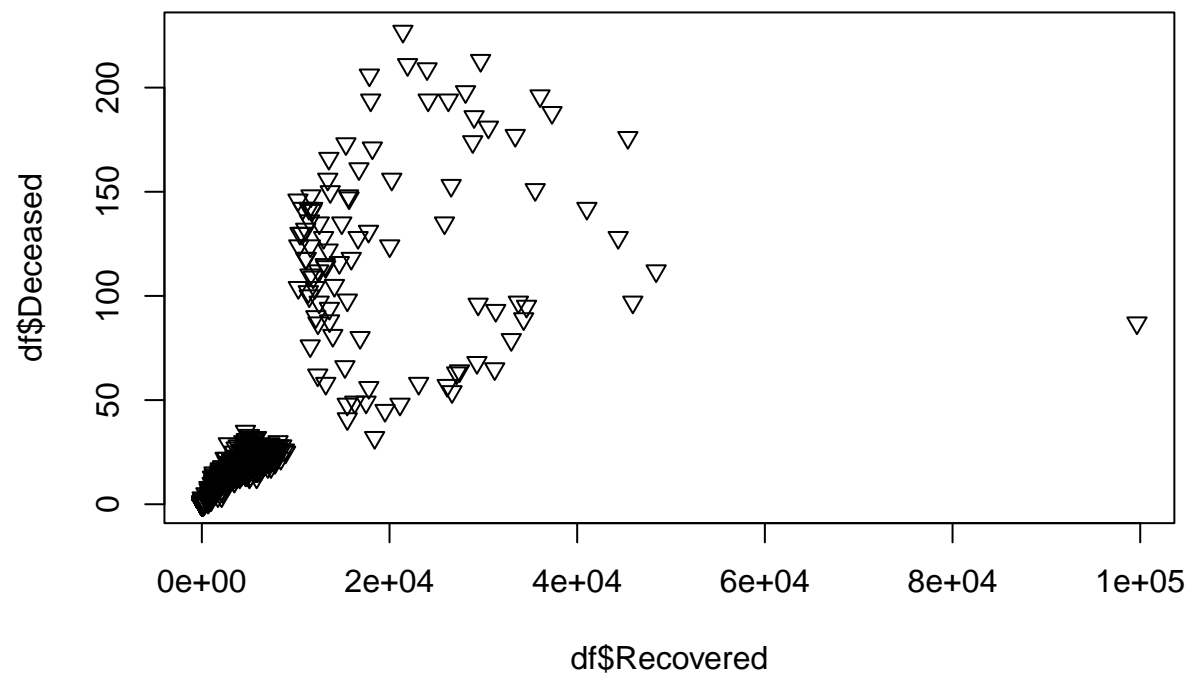
```
plot(df$Deceased,df$Confirmed,pch=25)
```
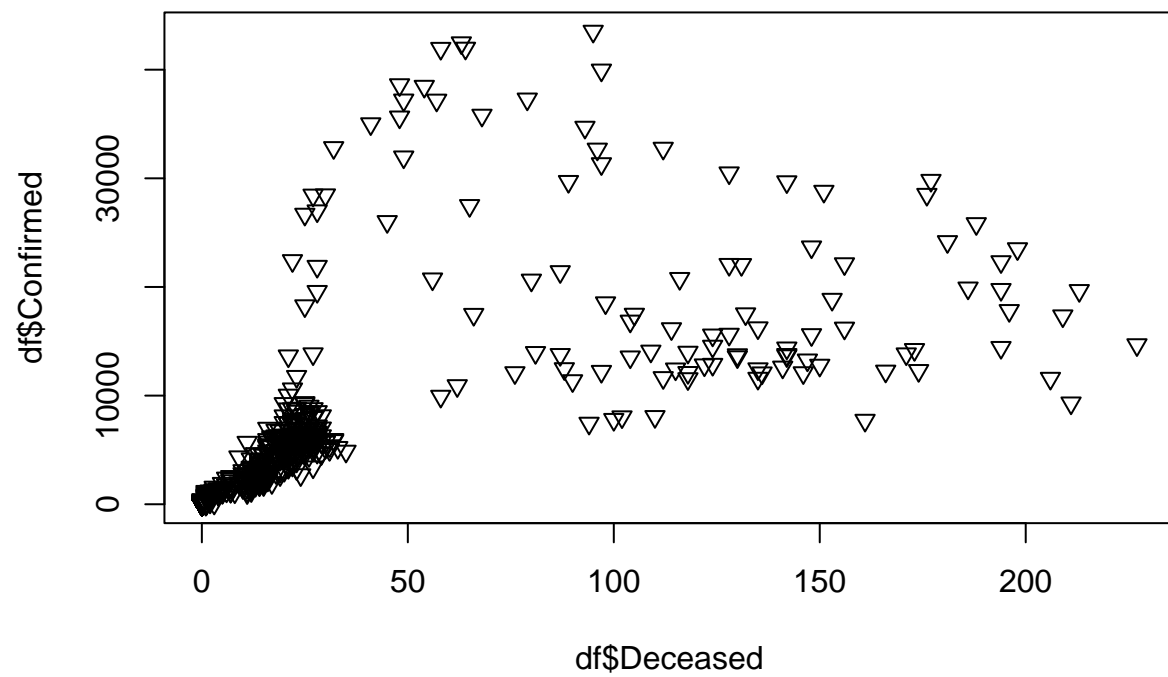
```
plot(df$Deceased,df$Recovered,pch=25)
```
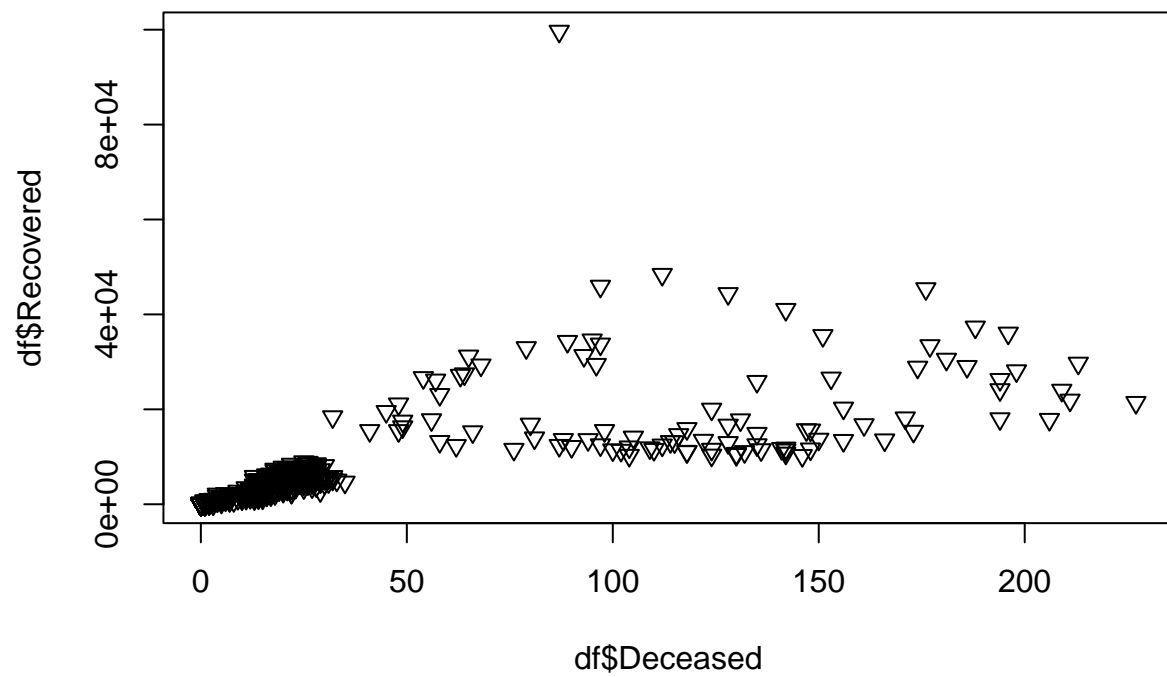
```
plot(df$Confirmed,type='l')
```
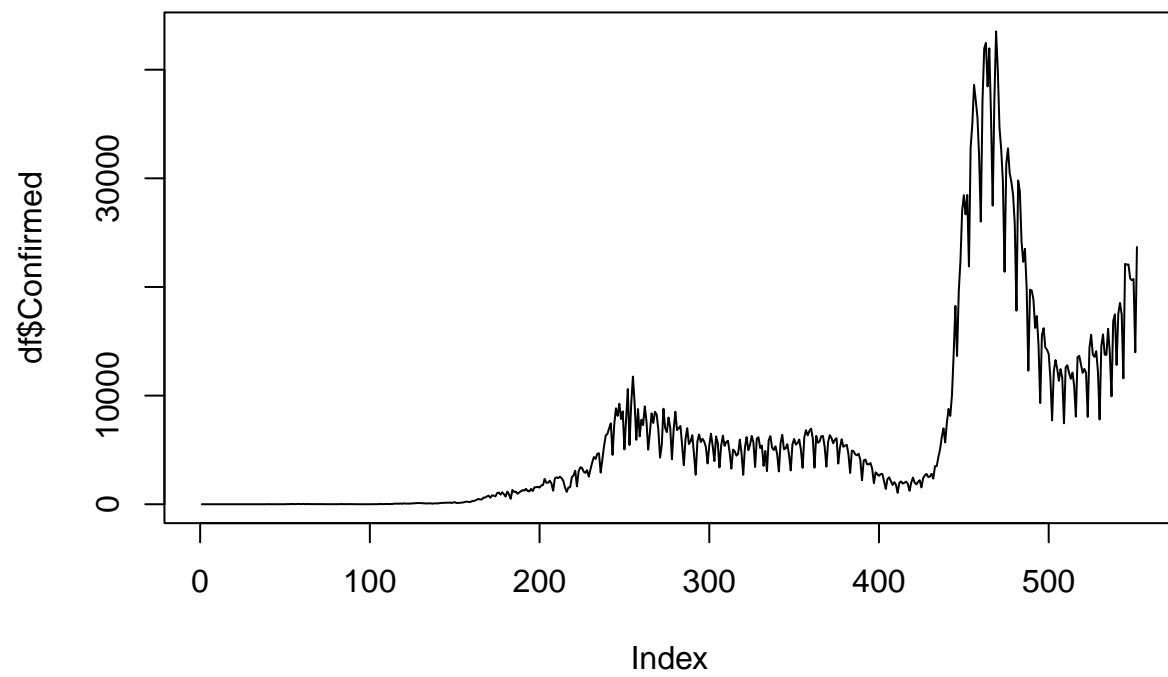
```
plot(df$Recovered,type='l')
```
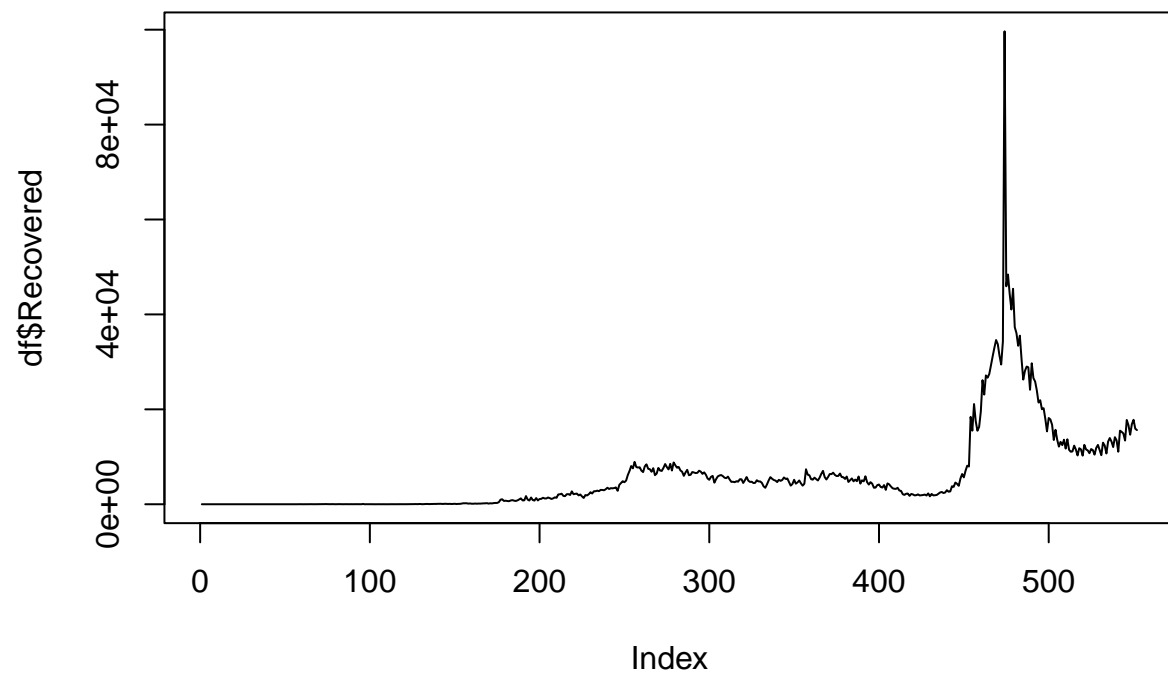
```
plot(df$Deceased,type='l')
```
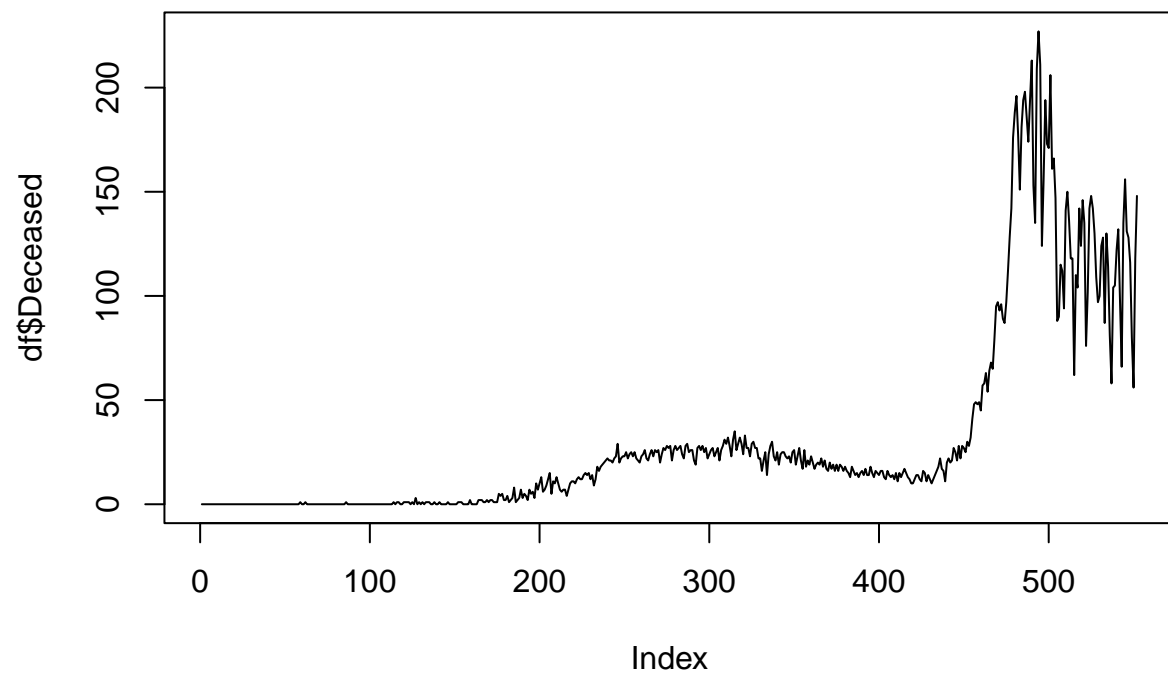
```
pie(df$Confirmed)
```
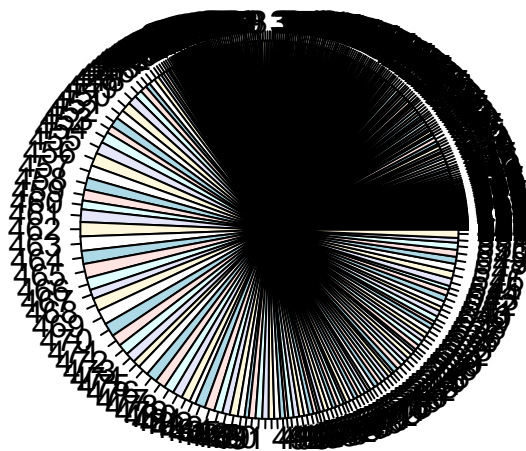
```
pie(df$Recovered)
```
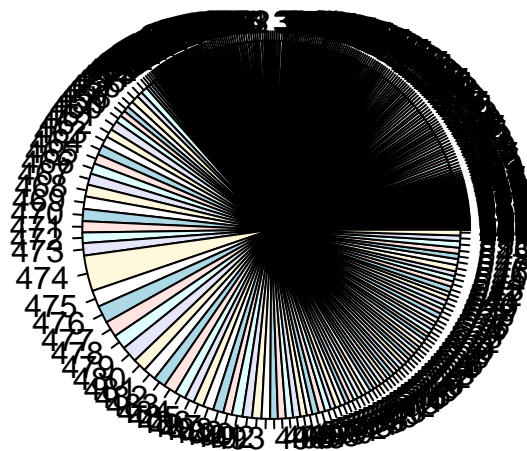
```
pie(df$Deceased)
```
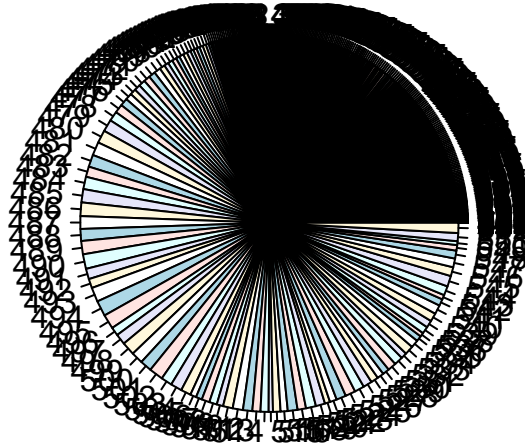
```
dotchart(df$Confirmed)
```
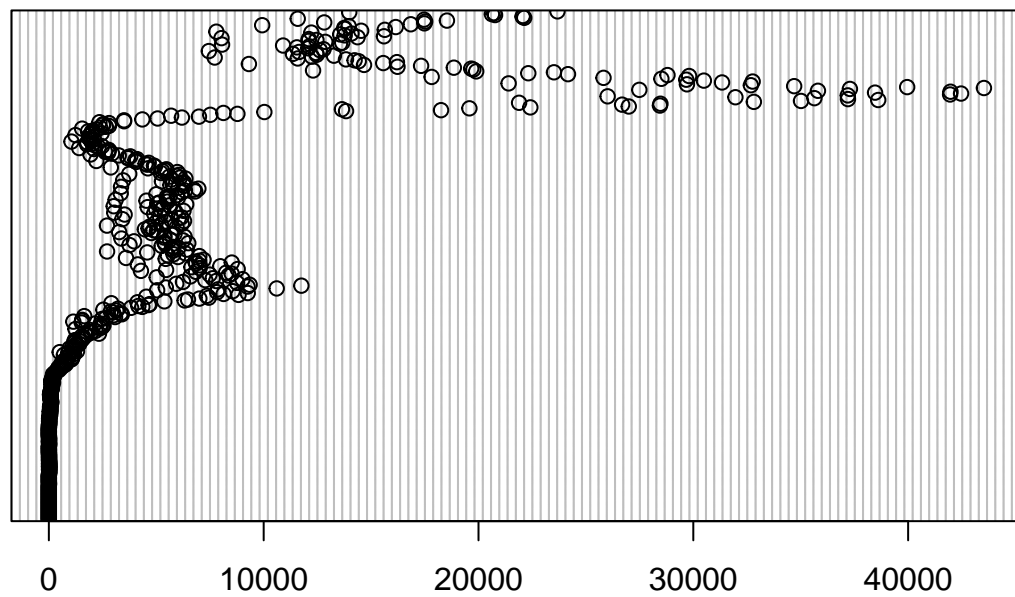
```
dotchart(df$Recovered)
```
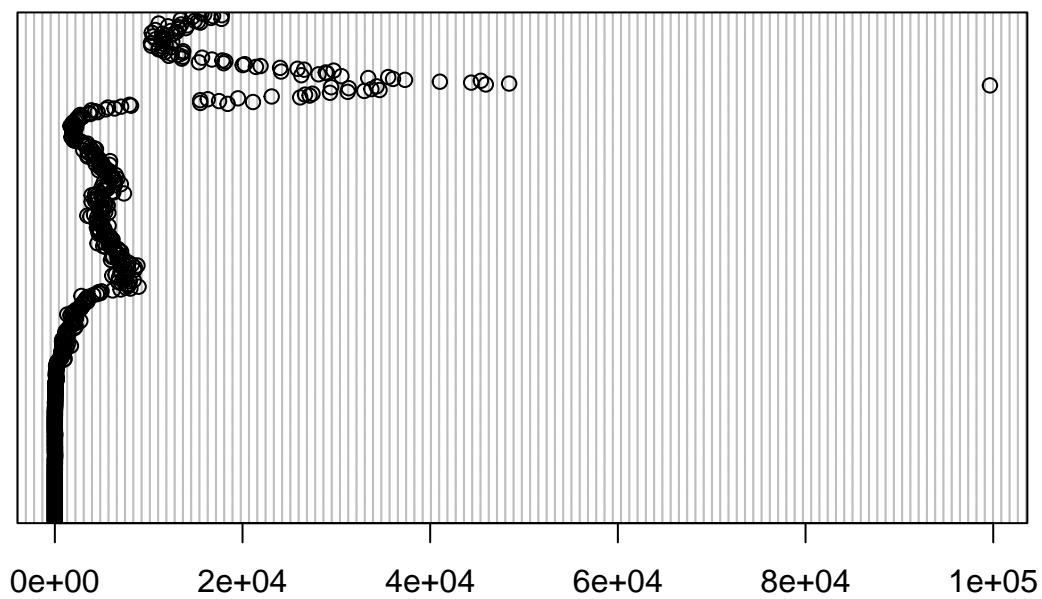
```
dotchart(df$Deceased)
```
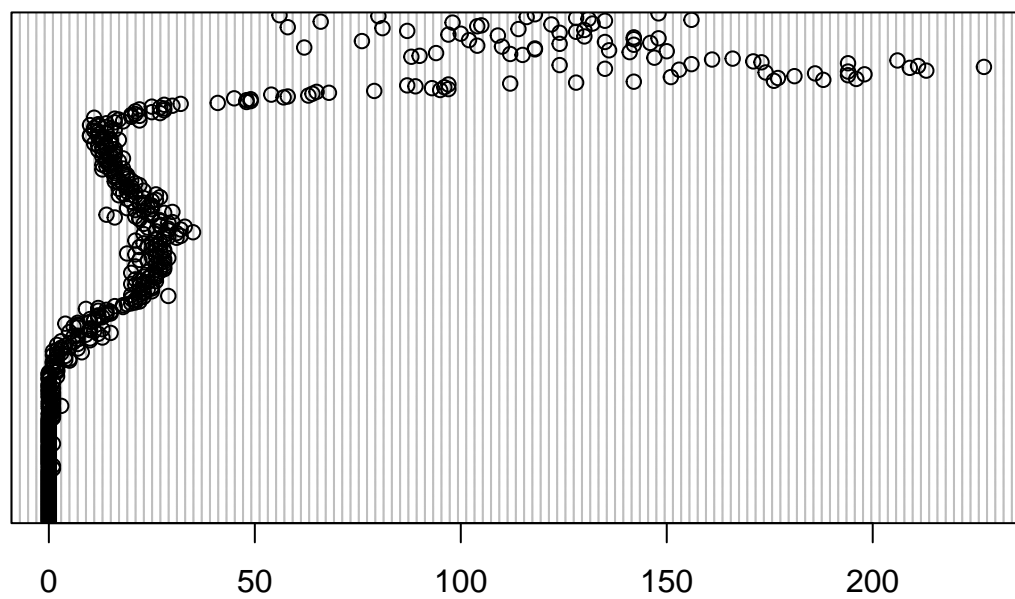
```
barplot(df$Confirmed)
```
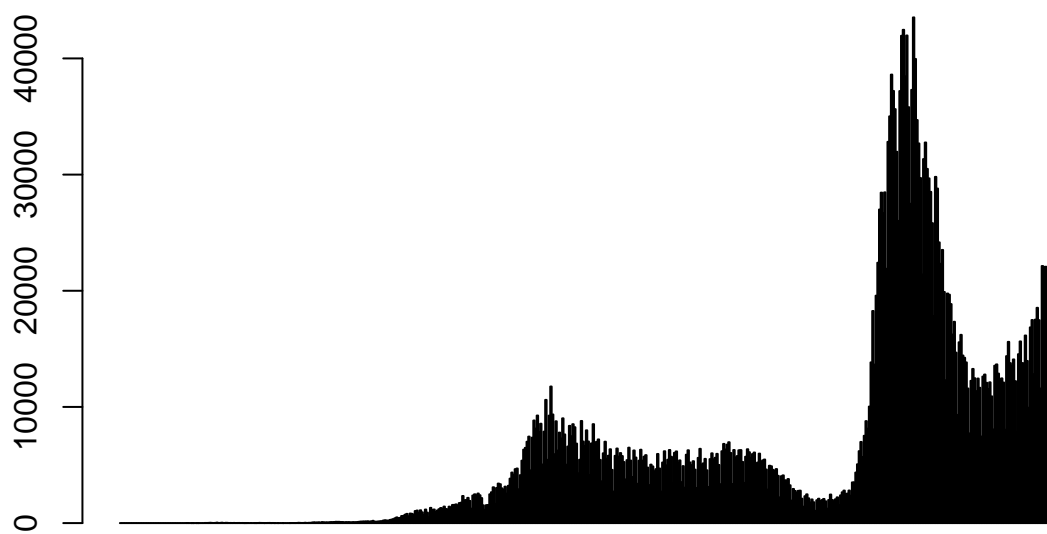
```
barplot(df$Recovered)
```
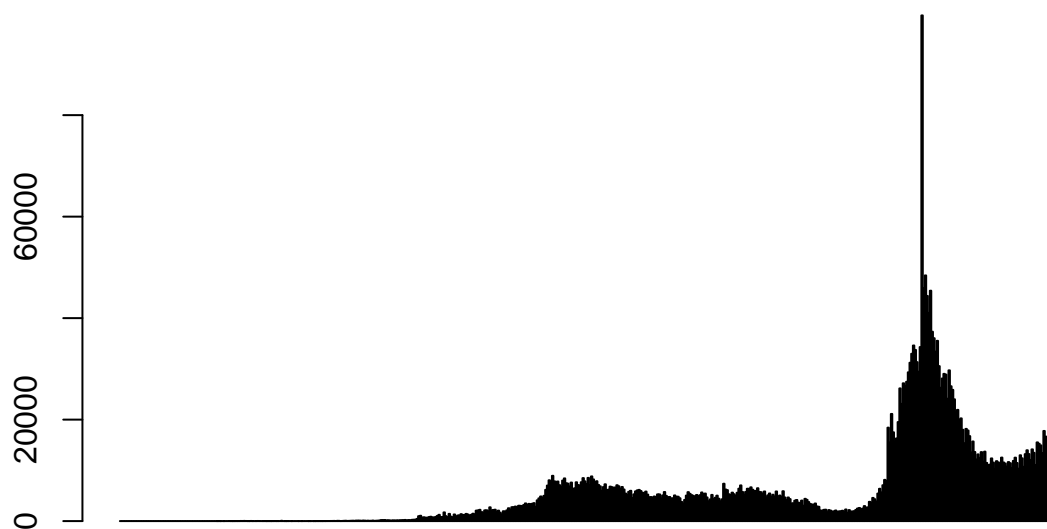
```
barplot(df$Deceased)
```
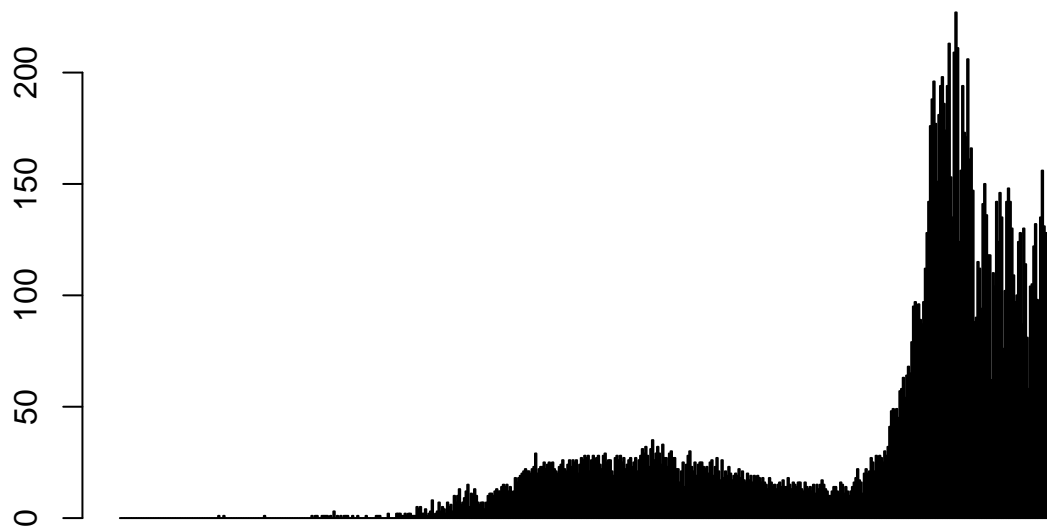
```
plot(df)
```
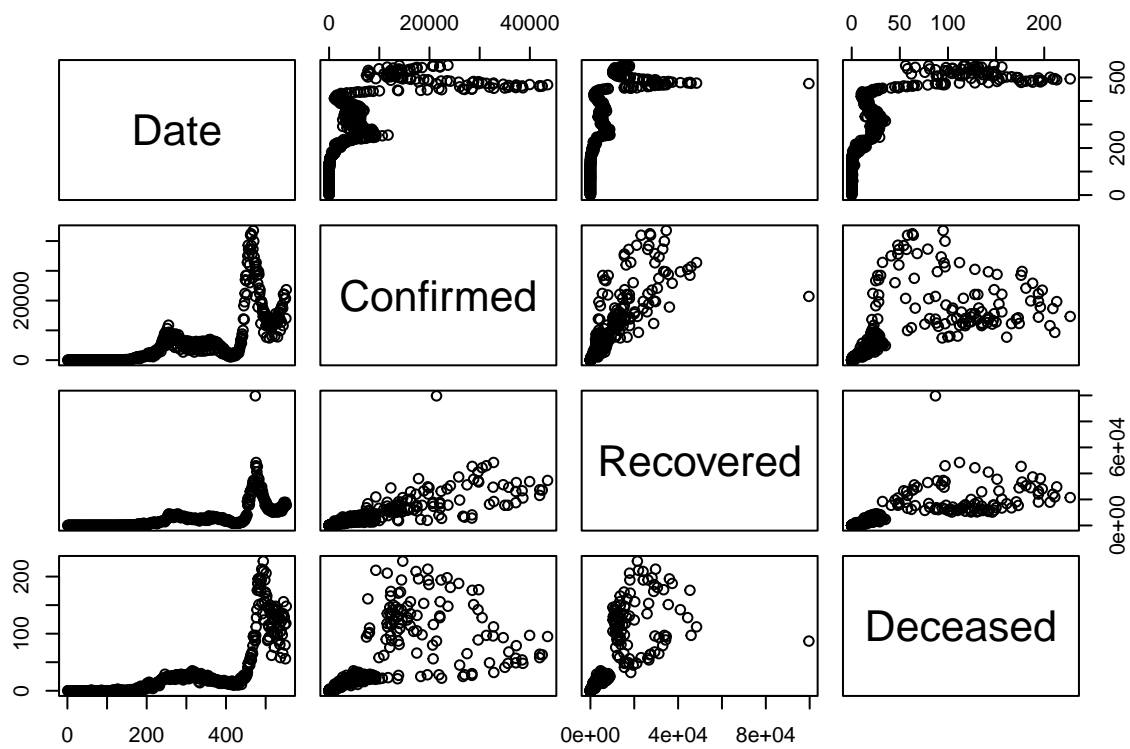
```
smoothScatter(df$Confirmed)
```
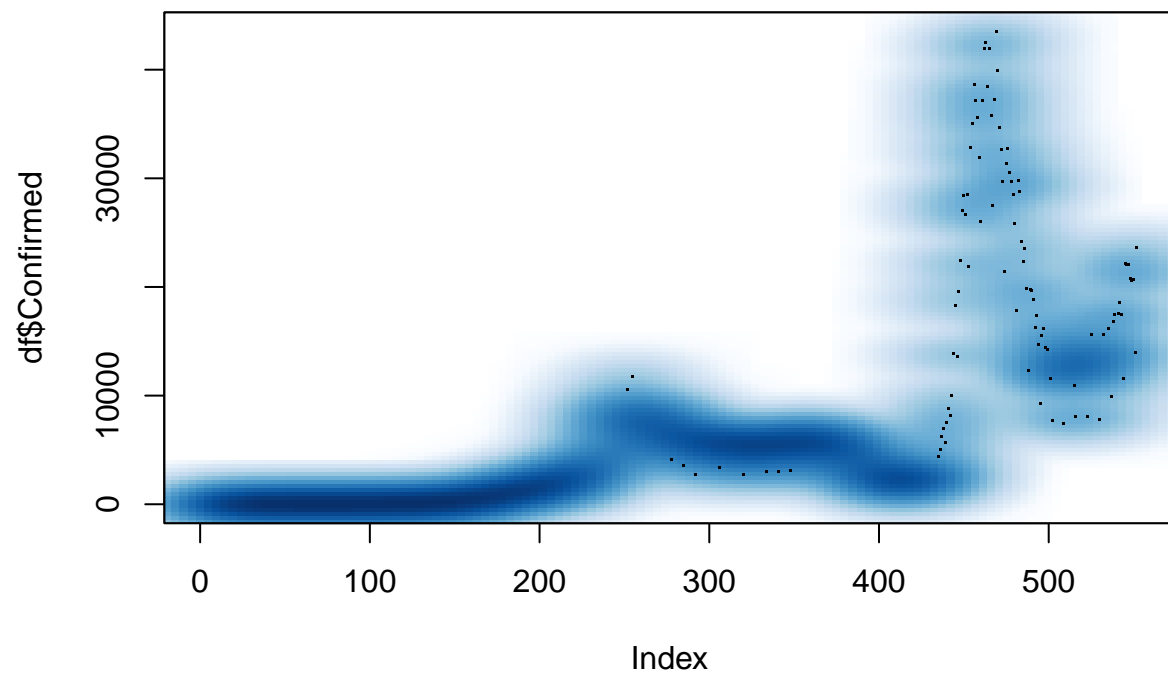
```
smoothScatter(df$Recovered)
```
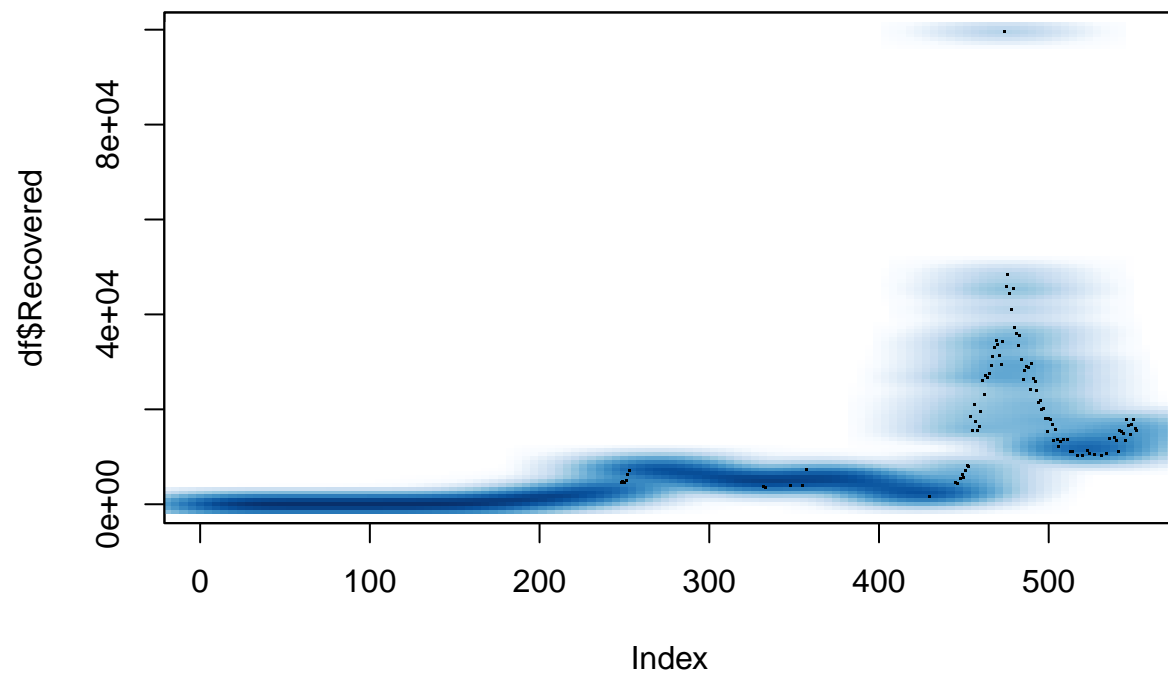
```
smoothScatter(df$Deceased)
```
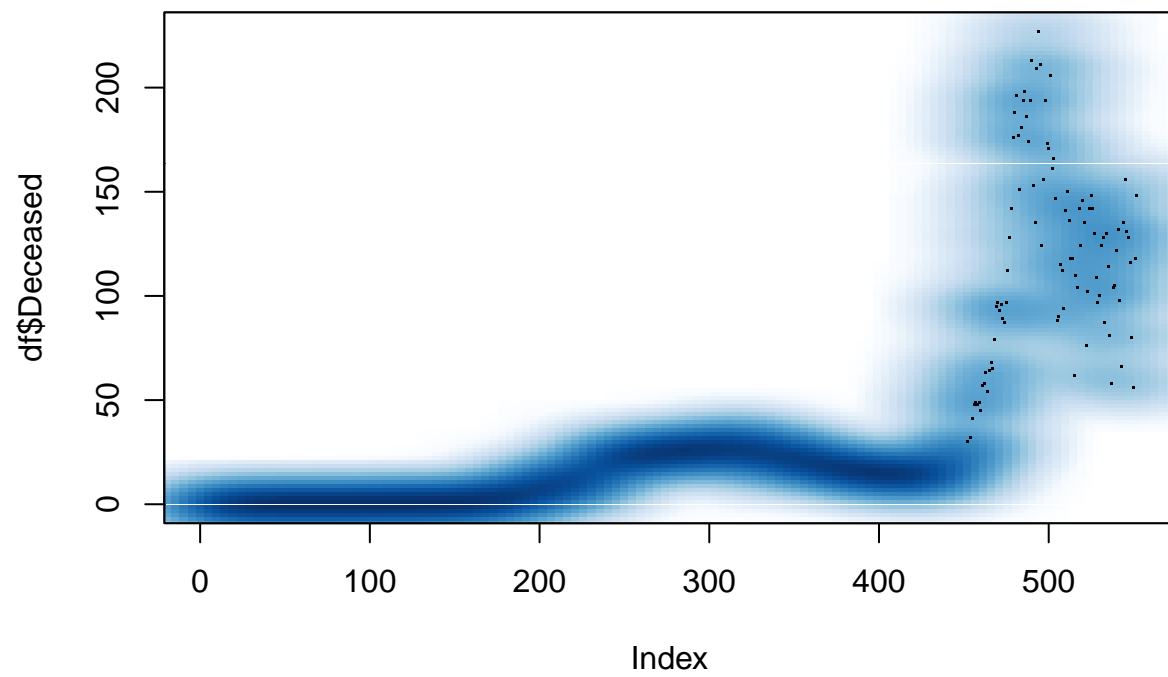
```
sunflowerplot(df$Confirmed)
```
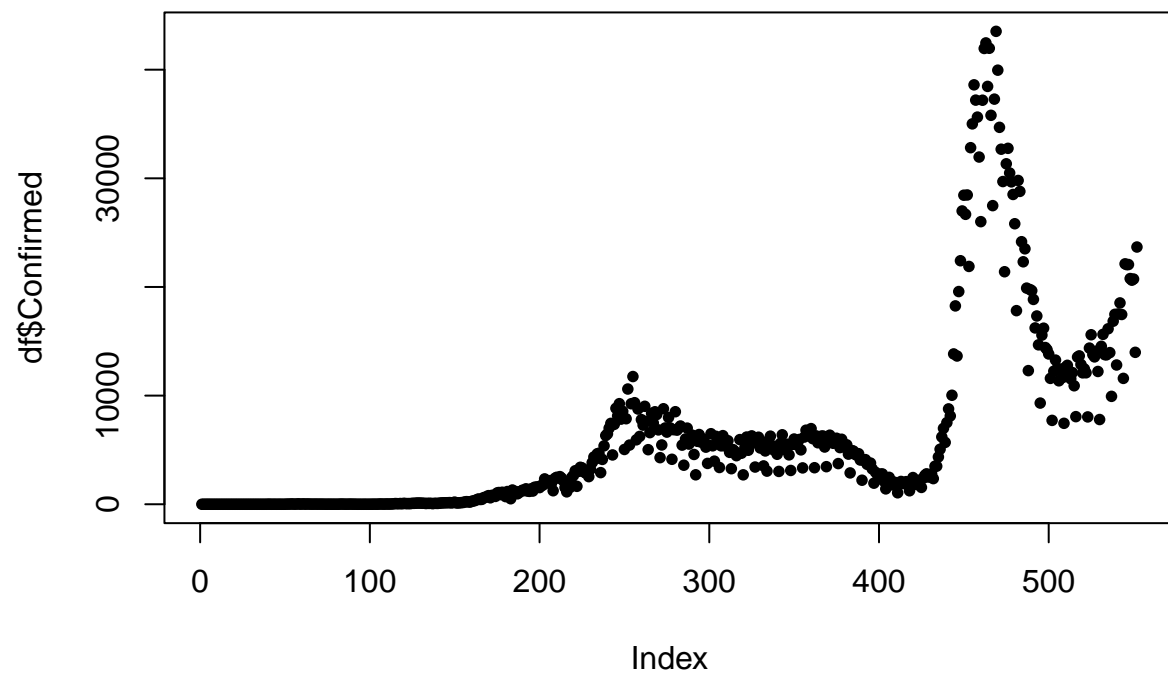
```
sunflowerplot(df$Recovered)
```
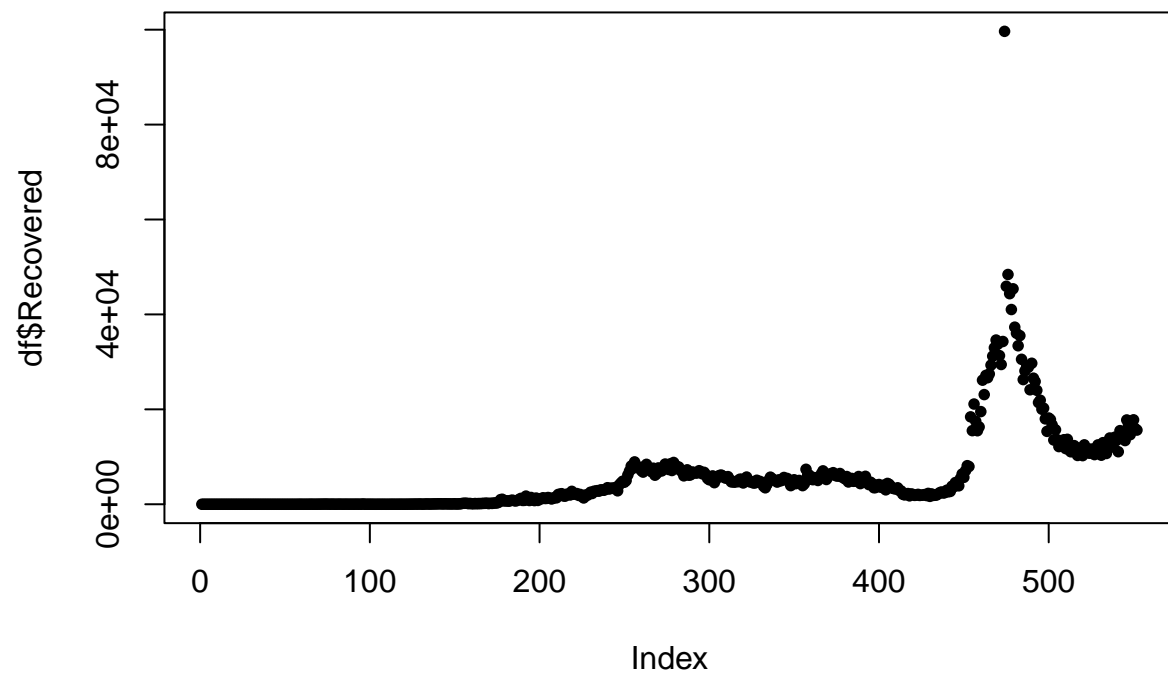
```
sunflowerplot(df$Deceased)
```
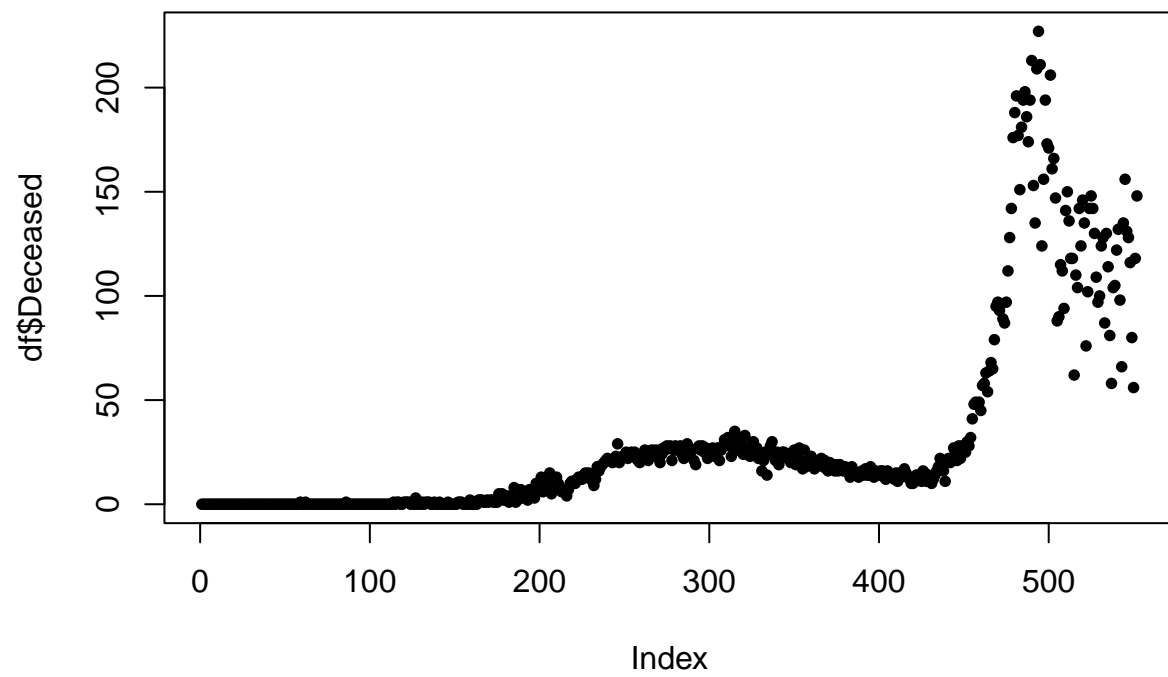
```
stripchart(df$Confirmed)
```
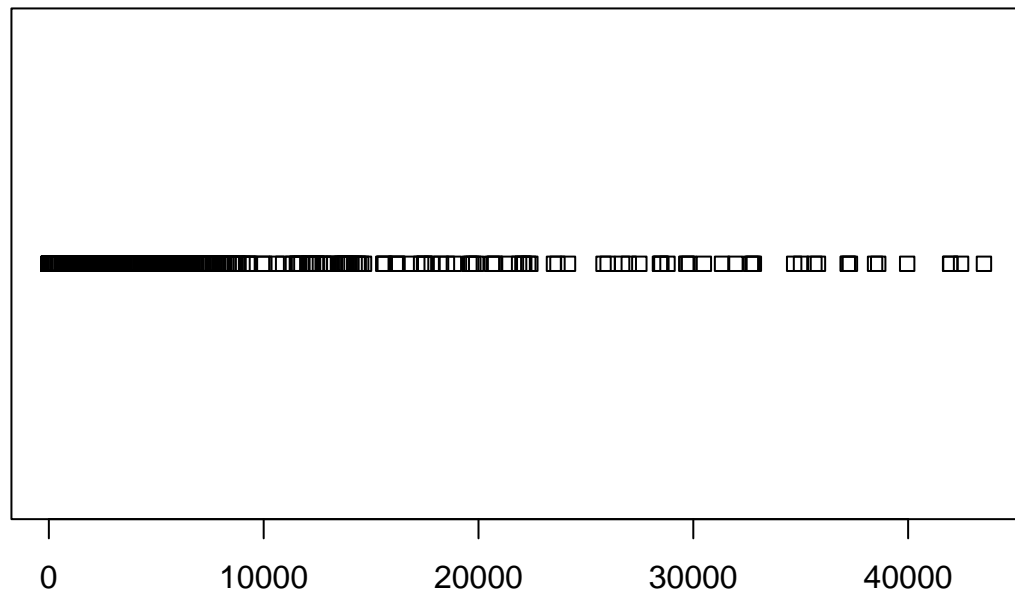
```
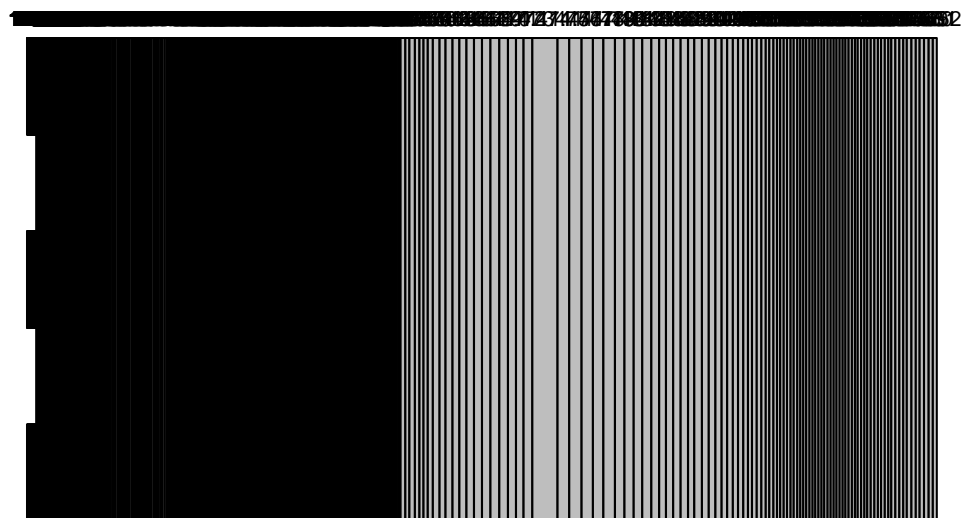stripchart(df$Recovered)
```
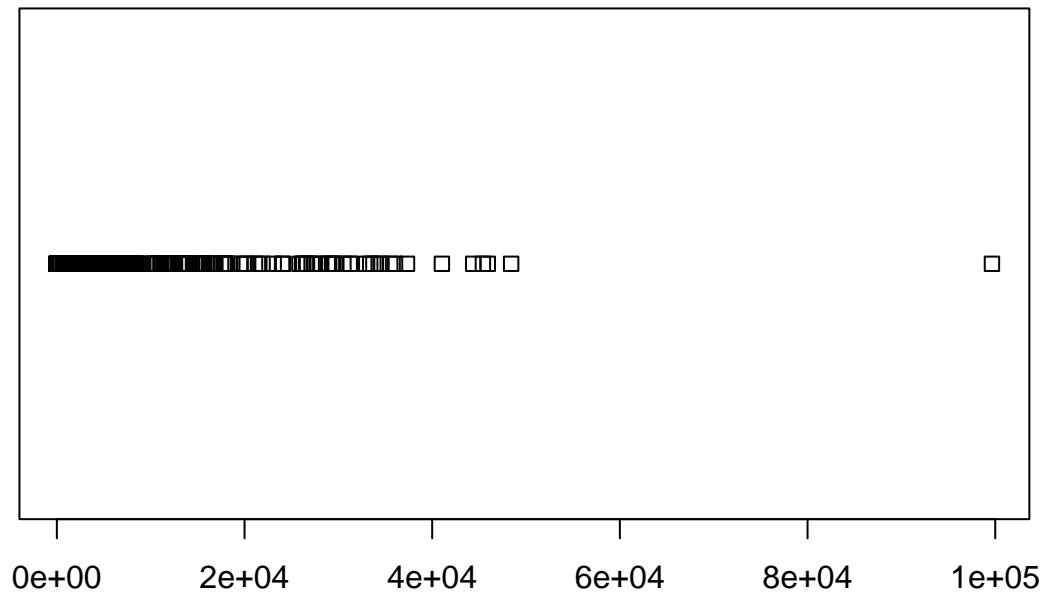
```
stripchart(df$Deceased)
```
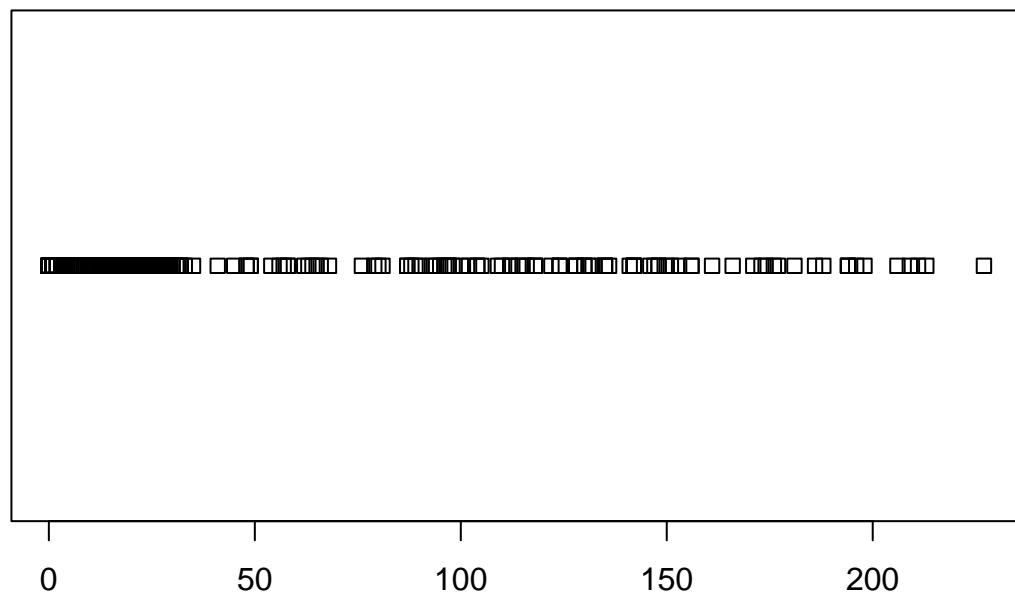
```
mosaicplot(df$Confirmed)
```

5218, 6185, 4969, 5456, 6293, 5711, 3423, 6049, 6169, 5177, 5397, 3527,
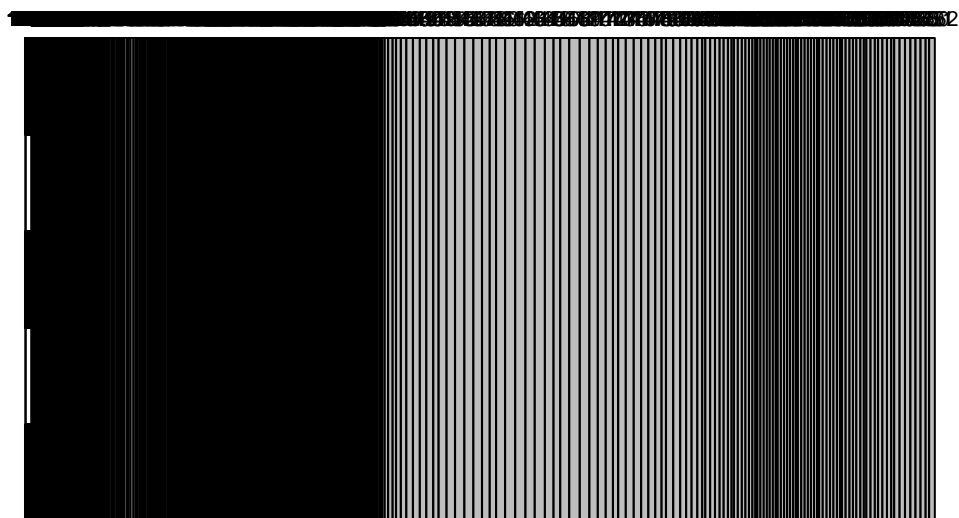

```
mosaicplot(df$Recovered)
```

, 4749, 4471, 4494, 5057, 4808, 4801, 4506, 3782, 3463, 4172, 5029, 5707


```
mosaicplot(df$Deceased)
```

28, 23, 31, 35, 26, 29, 32, 29, 24, 33, 27, 27, 23, 29, 30, 27, 27, 22, 22, 16, 2