breast_cancer.R

roshn

Fri Apr 05 15:49:40 2019

```
#Roshni Suhanda : 188009850 : MITA
#Multivariate Analysis
#Part 2 of Project : Breast Cancer Analysis

#Loading and Reading the data here
wisc_bc_df <- read.csv("C:/Users/roshn/Desktop/RBS/mva/wisc_bc_data.csv")
wisc_bc_df
```

```
##            id diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1    87139402         B      12.320        12.39          78.85     464.1
## 2     8910251         B      10.600        18.95          69.28     346.4
## 3      905520         B      11.040        16.83          70.92     373.2
## 4      868871         B      11.280        13.39          73.00     384.8
## 5     9012568         B      15.190        13.21          97.65     711.8
## 6      906539         B      11.570        19.04          74.20     409.7
## 7      925291         B      11.510        23.93          74.52     403.5
## 8       87880         M      13.810        23.75          91.56     597.8
## 9      862989         B      10.490        19.29          67.41     336.1
## 10      89827         B      11.060        14.96          71.49     373.9
## 11      91485         M      20.590        21.24         137.80    1320.0
## 12    8711003         B      12.250        17.94          78.27     460.3
## 13    9113455         B      13.140        20.74          85.98     536.9
## 14     857810         B      13.050        19.31          82.61     527.2
## 15    9111805         M      19.590        25.00         127.70    1191.0
## 16     925277         B      14.590        22.68          96.39     657.1
## 17     867387         B      15.710        13.93         102.00     761.7
## 18   89511502         B      12.670        17.30          81.25     489.9
## 19   89263202         M      20.090        23.86         134.70    1247.0
## 20     866714         B      12.190        13.29          79.08     455.8
## 21     874373         B      11.710        17.19          74.68     420.3
## 22     919812         B      11.690        24.44          76.37     406.4
## 23     904971         B      10.940        18.59          70.39     370.0
## 24     866458         B      15.100        16.39          99.58     674.5
## 25     864292         B      10.510        20.19          68.64     334.2
## 26     859983         M      13.800        15.79          90.43     584.1
## 27     862009         B      13.450        18.30          86.60     555.1
## 28     852973         M      15.300        25.27         102.40     732.4
## 29     898143         B       9.606        16.84          61.64     280.5
## 30    9010877         B      13.400        16.95          85.48     552.4
## 31     893548         B      13.050        13.84          82.71     530.6
## 32     868202         M      12.770        22.47          81.72     506.3
## 33    9113538         M      17.600        23.33         119.00     980.5
## 34     905501         B      12.270        17.92          78.41     466.1
## 35     915940         B      14.580        13.66          94.29     658.8
## 36    9013594         B      13.660        15.15          88.27     580.6
## 37     859575         M      18.940        21.31         123.60    1130.0
## 38     869476         B      11.900        14.65          78.11     432.8
## 39    8712729         M      16.780        18.80         109.30     886.3
## 40    8912280         M      16.240        18.77         108.80     805.1
## 41     887549         M      20.310        27.06         132.90    1288.0
## 42     871201         M      19.590        18.15         130.70    1214.0
## 43   84348301         M      11.420        20.38          77.58     386.1
## 44     897604         B      12.990        14.23          84.08     514.3
## 45     911673         B      13.900        16.62          88.97     599.4
## 46     877159         M      18.080        21.84         117.40    1024.0
## 47   90769601         B      11.130        16.62          70.47     381.1
## 48     899987         M      25.730        17.46         174.20    2010.0
## 49   90401601         B      13.510        18.89          88.10     558.1
## 50     892604         B      12.460        19.89          80.43     471.3
## 51    8810987         M      13.860        16.93          90.96     578.9
## 52   88147102         B      15.000        15.51          97.45     684.5
## 53     904357         B      11.800        17.26          75.26     431.9
## 54     883270         B      14.220        27.85          92.55     623.9
## 55     878796         M      23.290        26.67         158.90    1685.0
## 56    8611161         B      13.340        15.86          86.49     520.0
## 57      91550         B      11.740        14.69          76.31     426.0
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## 57      91550         B      11.740         14.69          76.31     426.0
## 58     874158         B      10.080         15.11          63.76     317.5
## 59     865423         M      24.250         20.20         166.20    1761.0
## 60      89122         M      19.400         18.18         127.20    1145.0
## 61     855625         M      19.070         24.81         128.30    1104.0
## 62    8712766         M      17.470         24.68         116.10     984.6
## 63  881094802         M      17.420         25.56         114.50     948.0
## 64     855167         M      13.440         21.58          86.18     563.0
## 65    8511133         M      15.340         14.26         102.50     704.4
## 66    8712064         B      12.340         22.22          79.85     464.5
## 67    8813129         B      13.270         17.02          84.55     546.4
## 68   89382601         B      14.610         15.69          92.68     664.9
## 69    8911834         B      13.850         15.18          88.99     587.4
## 70   91903901         B      11.670         20.02          75.21     416.2
## 71     855138         M      13.480         20.82          88.40     559.2
## 72     897880         B      10.050         17.53          64.41     310.8
## 73     894329         B       9.042         18.90          60.07     244.5
## 74   91376702         B      17.850         13.23         114.60     992.1
## 75    8711216         B      16.840         19.46         108.40     880.2
## 76     861597         B      12.360         21.80          79.78     466.1
## 77     874217         M      18.310         18.58         118.60    1041.0
## 78     859465         B      11.310         19.04          71.80     394.1
## 79   89382602         B      12.760         13.37          82.29     504.1
## 80   90524101         M      17.990         20.66         117.80     991.7
## 81    8712853         B      14.970         16.95          96.22     685.9
## 82     874839         B      12.300         15.90          78.83     463.7
## 83     901041         B      13.300         21.57          85.24     546.1
## 84     861598         B      14.640         15.24          95.77     651.9
## 85     901549         B      11.270         12.96          73.16     386.3
## 86       8913         B      12.890         13.12          81.89     515.9
## 87   91813702         B      12.340         12.27          78.94     468.5
## 88    9112085         B      13.380         30.72          86.34     557.2
## 89     851509         M      21.160         23.04         137.20    1404.0
## 90     917896         B      13.710         18.68          88.73     571.0
## 91     873586         B      12.810         13.06          81.29     508.8
## 92     914580         B      12.470         17.31          80.45     480.1
## 93     889403         M      15.610         19.38         100.00     758.6
## 94    9112594         B      13.000         25.13          82.61     520.2
## 95     874858         M      14.220         23.12          94.37     609.9
## 96     896839         M      16.030         15.51         105.80     793.2
## 97     904689         B      12.960         18.29          84.18     525.2
## 98     891703         B      11.850         17.46          75.54     432.7
## 99    8812844         B      10.180         17.53          65.12     313.1
## 100   8611555         M      25.220         24.91         171.50    1878.0
## 101   8910720         B      10.710         20.39          69.50     344.9
## 102    875099         B       9.720         18.22          60.73     288.1
## 103   8910748         B      11.290         13.04          72.23     388.0
## 104    848406         M      14.680         20.13          94.74     684.5
## 105    884448         B      13.200         17.43          84.13     541.6
## 106    911685         B      11.490         14.59          73.99     404.9
## 107   9010258         B      12.560         19.07          81.92     485.8
## 108  91544001         B      12.220         20.04          79.47     453.1
## 109    923465         B      10.820         24.21          68.89     361.6
## 110    906290         B      11.160         21.41          70.95     380.3
## 111    863031         B      11.640         18.33          75.17     412.5
## 112 871001502         B       8.219         20.70          53.27     203.9
## 113     86517         M      18.660         17.12         121.40    1077.0
## 114  84667401         M      13.730         22.61          93.60     578.3
## 115    857343         B      11.760         21.60          74.72     427.9
## 116    909445         M      17.270         25.42         112.40     928.8
## 117    877500         M      14.450         20.22          94.49     642.7
## 118    903507         M      15.490         19.97         102.40     744.7
## 119   8811842         M      19.800         21.56         129.70    1230.0
## 120   9010259         B      13.050         18.59          85.09     512.0
## 121     86561         B      13.850         17.21          88.44     588.7
## 122 881046502         M      20.580         22.14         134.70    1290.0
## 123    893061         B      11.600         24.49          74.23     417.2
## 124   9011971         M      21.710         17.25         140.90    1546.0
## 125    898690         B      11.470         16.03          73.02     402.7
## 126     89296         B      11.460         18.16          73.59     403.1
## 127    863030         M      13.110         15.56          87.21     530.2
## 128     90291         M      14.600         23.29          93.97     664.7
## 129    866203         M      19.000         18.91         123.40    1138.0
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## 130  91979701         M      14.270        22.55          93.77     629.8
## 131    907914         M      14.900        22.53         102.10     685.0
## 132    906878         B      13.660        19.13          89.46     575.3
## 133    922296         B      13.210        28.06          84.88     538.4
## 134    926424         M      21.560        22.39         142.00    1479.0
## 135  91544002         B      11.060        17.12          71.25     366.5
## 136    852552         M      16.650        21.38         110.00     904.6
## 137    903483         B       8.734        16.84          55.27     234.3
## 138    871122         B      12.060        12.74          76.84     448.6
## 139  89742801         M      17.060        21.00         111.80     918.6
## 140    857374         B      11.940        18.24          75.71     437.6
## 141    852781         M      18.610        20.25         122.10    1094.0
## 142    842302         M      17.990        10.38         122.80    1001.0
## 143    926682         M      20.130        28.25         131.20    1261.0
## 144    858986         M      14.250        22.15          96.42     645.7
## 145    852763         M      14.580        21.53          97.41     644.8
## 146    874662         B      11.810        17.39          75.27     428.9
## 147  84610002         M      15.780        17.89         103.60     781.0
## 148   9010872         B      16.500        18.29         106.60     838.1
## 149    894335         B      12.430        17.00          78.60     477.3
## 150    863270         B      12.360        18.54          79.01     466.7
## 151    894089         B      12.490        16.85          79.19     481.6
## 152    907145         B       9.742        19.12          61.93     289.7
## 153    869224         B      12.900        15.92          83.74     512.2
## 154    922577         B      10.320        16.35          65.31     324.9
## 155  89143602         B      14.410        19.73          96.03     651.0
## 156 901034301         B       9.436        18.32          59.82     278.6
## 157   8911800         B      13.590        17.84          86.24     572.3
## 158    855563         M      10.950        21.35          71.90     371.1
## 159    909777         B      10.570        18.32          66.82     340.9
## 160    857156         B      13.490        22.30          86.91     561.0
## 161    861853         B      13.270        14.76          84.74     551.7
## 162   8913049         B      11.260        19.96          73.72     394.1
## 163    901028         B      13.870        16.21          88.52     593.7
## 164     89346         B       9.000        14.40          56.36     246.3
## 165    915143         M      23.090        19.83         152.10    1682.0
## 166    873592         M      27.220        21.87         182.10    2250.0
## 167  88143502         B      14.340        13.47          92.51     641.2
## 168    888570         M      17.290        22.13         114.40     947.8
## 169   8711002         B      13.150        15.34          85.31     538.9
## 170    869931         B      13.740        17.91          88.12     585.0
## 171     85715         M      13.170        18.66          85.98     534.6
## 172    908489         M      13.980        19.62          91.12     599.5
## 173  84458202         M      13.710        20.83          90.20     577.9
## 174   8910499         B      13.590        21.84          87.16     561.0
## 175     87163         M      13.430        19.63          85.84     565.4
## 176   8610908         B      12.860        18.00          83.19     506.3
## 177    857637         M      19.210        18.57         125.50    1152.0
## 178    904302         B      11.060        14.83          70.31     378.2
## 179    857010         M      18.650        17.60         123.70    1076.0
## 180    862965         B      12.180        20.52          77.22     458.7
## 181    877501         B      12.230        19.56          78.54     461.0
## 182   8610404         M      16.070        19.65         104.10     817.7
## 183    891923         B      13.770        13.27          88.06     582.7
## 184    879523         M      15.120        16.68          98.78     716.6
## 185    897132         B      11.220        19.86          71.94     387.3
## 186    891936         B      10.910        12.35          69.14     363.7
## 187    881972         M      17.050        19.08         113.40     895.0
## 188    867739         M      18.450        21.91         120.20    1075.0
## 189    894618         M      20.160        19.66         131.10    1274.0
## 190   8910996         B       9.742        15.67          61.50     289.9
## 191    869104         M      16.110        18.05         105.10     813.0
## 192    904647         B      11.930        10.91          76.14     442.7
## 193    911384         B      14.920        14.93          96.45     686.9
## 194  84799002         M      14.540        27.54          96.73     658.8
## 195    873701         M      15.700        20.31         101.20     766.6
## 196   8611792         M      19.100        26.29         129.10    1132.0
## 197   9010018         M      15.080        25.74          98.00     716.6
## 198    861648         B      14.620        24.02          94.57     662.7
## 199  91813701         B      13.460        18.75          87.44     551.1
## 200    902975         B      12.210        14.09          78.78     462.0
## 201    855133         M      14.990        25.20          95.54     698.8
## 202     90745         B      10.800        21.98          68.79     359.9
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## 203    905557         B      14.990        22.11          97.53     693.7
## 204     86408         B      12.630        20.76          82.15     480.4
## 205  89864002         B      11.710        15.45          75.03     420.3
## 206    915460         M      15.460        23.95         103.80     731.3
## 207 911320501         B      11.600        18.36          73.88     412.7
## 208    892189         M      11.760        18.14          75.00     431.1
## 209    893526         B      13.500        12.71          85.69     566.2
## 210    873593         M      21.090        26.57         142.70    1311.0
## 211   8912284         B      12.890        15.70          84.08     516.6
## 212    857793         M      14.710        21.59          95.55     656.9
## 213    859717         M      17.200        24.52         114.20     929.4
## 214    902727         B      13.280        13.72          85.79     541.8
## 215    911391         B      10.880        15.62          70.41     358.9
## 216    858970         B      10.170        14.88          64.55     311.9
## 217    917080         B      12.750        16.70          82.51     493.8
## 218    911654         B      14.200        20.53          92.41     618.4
## 219    843786         M      12.450        15.70          82.57     477.1
## 220   8712289         M      23.270        22.04         152.10    1686.0
## 221    891716         B      12.720        13.78          81.78     492.1
## 222    906024         B      12.700        12.17          80.88     495.0
## 223    892438         M      19.530        18.90         129.50    1217.0
## 224    861103         B      11.450        20.97          73.81     401.5
## 225    871642         B      10.660        15.15          67.49     349.6
## 226    894047         B       8.597        18.60          54.09     221.2
## 227    915276         B       9.676        13.14          64.12     272.5
## 228    908194         M      20.180        19.54         133.80    1250.0
## 229    877989         M      17.540        19.32         115.10     951.6
## 230    897137         B      11.250        14.78          71.38     390.0
## 231   9112366         B      11.630        29.29          74.87     415.1
## 232    904969         B      12.340        14.95          78.29     469.1
## 233     86409         B      14.260        19.65          97.83     629.9
## 234   8953902         M      16.270        20.71         106.90     813.7
## 235    924084         B      12.770        29.43          81.35     507.9
## 236    913512         B      11.680        16.17          75.49     420.5
## 237  87556202         M      14.860        23.21         100.40     671.4
## 238     91805         B       8.571        13.10          54.53     221.3
## 239  88466802         B      10.650        25.22          68.01     347.0
## 240    884437         B      10.480        19.86          66.72     337.7
## 241    886452         M      13.960        17.05          91.43     602.4
## 242    864496         B       8.726        15.83          55.84     230.9
## 243    905539         B       9.397        21.68          59.75     268.8
## 244    888264         M      17.350        23.06         111.00     933.1
## 245    885429         M      19.730        19.82         130.70    1206.0
## 246    923169         B       9.683        19.34          61.05     285.7
## 247    907367         B      10.030        21.28          63.19     307.3
## 248    921386         B      14.470        24.99          95.81     656.4
## 249  85713702         B       8.196        16.84          51.71     201.9
## 250   9111843         B      12.000        28.23          76.77     442.5
## 251    914862         B      15.040        16.74          98.73     689.4
## 252    887181         M      15.660        23.20         110.20     773.5
## 253    903011         B      11.270        15.50          73.38     392.0
## 254  90439701         M      17.910        21.02         124.40     994.0
## 255    918192         B      13.940        13.17          90.31     594.2
## 256    905978         B       9.405        21.70          59.60     271.2
## 257    911150         B      14.530        19.34          94.25     659.7
## 258    905502         B      11.360        17.57          72.49     399.8
## 259    859487         B      12.780        16.49          81.37     502.5
## 260   8510426         B      13.540        14.36          87.46     566.3
## 261    903554         B      12.100        17.72          78.07     446.2
## 262    924934         B      10.290        27.61          65.67     321.4
## 263      8670         M      15.460        19.48         101.70     748.9
## 264     91227         B      13.900        19.24          88.73     602.9
## 265  85382601         M      17.020        23.98         112.80     899.3
## 266    844981         M      13.000        21.82          87.50     519.8
## 267   8811779         B      10.200        17.48          65.05     321.2
## 268    859711         B       8.888        14.64          58.79     244.0
## 269  91376701         B      12.250        22.44          78.18     466.5
## 270    884180         M      19.400        23.50         129.10    1155.0
## 271  90401602         B      12.800        17.46          83.05     508.3
## 272    846226         M      19.170        24.80         132.40    1123.0
## 273    903811         B      14.060        17.18          89.75     609.1
## 274   8610175         B      12.310        16.52          79.19     470.9
## 275    877486         M      19.180        22.49         127.50    1148.0
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## 275    877486         M      19.180        22.49         127.50    1148.0
## 276   8810703         M      28.110        18.47         188.50    2499.0
## 277    914333         B      14.870        20.21          96.12     680.9
## 278    926954         M      16.600        28.08         108.30     858.1
## 279    923748         B      10.860        21.48          68.51     360.5
## 280    921092         B       7.729        25.49          47.98     178.8
## 281   8610637         M      18.050        16.15         120.20    1006.0
## 282     91789         B      11.260        19.83          71.30     388.1
## 283    898678         B      12.060        18.90          76.66     445.3
## 284  88350402         B      13.640        15.60          87.38     575.3
## 285    889719         M      17.190        22.07         111.60     928.3
## 286    913102         B      14.640        16.85          94.21     666.0
## 287   8810955         M      14.190        23.81          92.87     610.7
## 288    916838         M      19.890        20.26         130.50    1214.0
## 289    884948         M      20.940        23.56         138.90    1364.0
## 290    914366         B      12.650        18.17          82.69     485.6
## 291    925236         B       9.423        27.88          59.26     271.3
## 292   9013005         B      13.690        16.07          87.84     579.1
## 293    875938         M      13.770        22.29          90.63     588.9
## 294   9011495         B      12.210        18.02          78.31     458.4
## 295   9012000         M      22.010        21.90         147.20    1482.0
## 296  91762702         M      24.630        21.60         165.50    1841.0
## 297    919555         M      20.550        20.86         137.80    1308.0
## 298    849014         M      19.810        22.15         130.00    1260.0
## 299    918465         B      12.070        13.44          77.83     445.2
## 300    911916         M      16.250        19.51         109.80     815.8
## 301   8711803         M      19.190        15.94         126.30    1157.0
## 302    892214         B      14.260        18.17          91.22     633.1
## 303    871149         B      10.900        12.96          68.69     366.8
## 304    915691         M      13.400        20.52          88.64     556.7
## 305   8812877         M      15.750        20.25         102.60     761.3
## 306  88206102         M      20.510        27.81         134.40    1319.0
## 307    925622         M      15.220        30.62         103.40     716.9
## 308      9047         B      12.940        16.17          83.18     507.6
## 309  86973701         B      14.950        18.77          97.84     689.5
## 310   8812818         B      13.560        13.90          88.59     561.3
## 311  91930402         M      20.470        20.67         134.70    1299.0
## 312   8860702         M      17.300        17.08         113.00     928.2
## 313    912558         B      13.700        17.64          87.76     571.1
## 314   8911164         B      11.890        17.36          76.20     435.6
## 315    856106         M      13.280        20.28          87.32     545.2
## 316   9013579         B      13.460        28.21          85.89     562.1
## 317  84358402         M      20.290        14.34         135.10    1297.0
## 318  88299702         M      23.210        26.97         153.50    1670.0
## 319    923780         B      11.130        22.44          71.49     378.4
## 320     89869         B      14.760        14.74          94.87     668.7
## 321    913063         B      12.450        16.41          82.85     476.7
## 322    854253         M      16.740        21.59         110.10     869.5
## 323     86208         M      20.260        23.03         132.40    1264.0
## 324    864685         B      11.930        21.53          76.53     438.6
## 325    883539         B      12.420        15.04          78.61     476.5
## 326   8612399         M      18.460        18.52         121.10    1075.0
## 327  88249602         B      14.030        21.25          89.79     603.4
## 328    864877         M      15.780        22.91         105.70     782.6
## 329 871001501         B      13.000        20.78          83.51     519.4
## 330     89812         M      23.510        24.27         155.10    1747.0
## 331    868999         B       9.738        11.97          61.24     288.5
## 332    908916         B      12.870        19.54          82.67     509.2
## 333     87127         B      10.800         9.71          68.77     357.6
## 334    894090         B      12.180        14.08          77.25     461.4
## 335    868826         M      14.950        17.57          96.85     678.1
## 336   8810436         B      15.270        12.91          98.17     725.5
## 337 901034302         B      12.540        18.07          79.42     491.9
## 338    859471         B       9.029        17.33          58.79     250.5
## 339    897630         M      18.770        21.43         122.90    1092.0
## 340    912600         B      15.730        11.28         102.80     747.2
## 341    905189         B      16.140        14.86         104.30     800.0
## 342  86135502         M      19.020        24.59         122.00    1076.0
## 343    895633         M      16.260        21.88         107.50     826.8
## 344    883852         B      11.300        18.19          73.93     389.4
## 345  86730502         M      16.160        21.54         106.20     809.8
## 346    864033         B       9.777        16.99          62.50     290.2
## 347   9010333         B       8.878        15.49          56.74     241.0
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## 348    869218         B      11.430        17.31          73.66     398.0
## 349  91594602         M      15.050        19.07          97.26     701.9
## 350   9110720         B      11.990        24.89          77.61     441.3
## 351    909410         B      14.020        15.66          89.59     606.5
## 352    853201         M      17.570        15.05         115.00     955.1
## 353    924632         B      12.880        28.92          82.50     514.3
## 354    864018         B      11.340        21.26          72.48     396.5
## 355    859283         M      14.780        23.94          97.40     668.3
## 356    859464         B       9.465        21.01          60.11     269.4
## 357    879804         B       9.876        17.27          62.92     295.4
## 358   8810528         B      11.840        18.94          75.51     428.0
## 359    844359         M      18.250        19.98         119.60    1040.0
## 360    924342         B       9.333        21.94          59.01     264.0
## 361    883263         M      20.480        21.46         132.50    1306.0
## 362    846381         M      15.850        23.95         103.70     782.7
## 363   9113846         B      12.270        29.97          77.42     465.4
## 364  90317302         B      10.260        12.22          65.75     321.6
## 365     86211         B      12.180        17.84          77.79     451.1
## 366    921385         B      11.540        14.44          74.65     402.9
## 367   8711202         M      17.680        20.74         117.40     963.7
## 368   9112712         B       9.755        28.20          61.68     290.9
## 369    893988         B      11.540        10.72          73.73     409.1
## 370    886226         M      19.450        19.33         126.50    1169.0
## 371     91505         B      12.540        16.32          81.25     476.3
## 372    859196         B       9.173        13.86          59.20     260.9
## 373    897374         B      12.300        19.02          77.88     464.4
## 374    912193         B      12.160        18.03          78.29     455.3
## 375    911202         B      12.620        17.15          80.62     492.9
## 376    914101         B      12.460        12.83          78.83     477.3
## 377    921644         B      14.740        25.42          94.70     668.6
## 378     90251         B      12.390        17.48          80.64     462.9
## 379   8911230         B      11.330        14.16          71.79     396.6
## 380    884689         B      11.520        14.93          73.87     406.3
## 381    909231         B      13.850        19.60          88.68     592.6
## 382    892399         B      10.510        23.09          66.85     334.2
## 383  86135501         M      14.480        21.46          94.25     648.2
## 384    854039         M      16.130        17.88         107.00     807.2
## 385    916221         B      11.340        18.61          72.76     391.2
## 386    922840         B      10.260        16.58          65.85     320.8
## 387   8910988         M      21.750        20.99         147.30    1491.0
## 388    892657         B      10.490        18.61          66.86     334.3
## 389    862717         M      13.610        24.98          88.05     582.7
## 390    915452         B      16.300        15.70         104.70     819.8
## 391   9110732         M      17.750        28.03         117.30     981.6
## 392    925311         B      11.200        29.37          70.67     386.0
## 393    857373         B      13.640        16.34          87.21     571.8
## 394   8912049         M      19.160        26.60         126.20    1138.0
## 395  91903902         B      13.680        16.33          87.76     575.5
## 396    902976         B      13.880        16.16          88.37     596.6
## 397    906616         B      11.610        16.02          75.46     408.2
## 398    861799         M      15.370        22.76         100.20     728.2
## 399    898431         M      19.680        21.68         129.90    1194.0
## 400    862261         B       9.787        19.94          62.11     294.5
## 401    917897         B       9.847        15.68          63.00     293.2
## 402    865468         B      13.370        16.39          86.10     553.5
## 403    854002         M      19.270        26.47         127.90    1162.0
## 404    901288         M      20.640        17.35         134.80    1335.0
## 405   9113239         B      13.240        20.13          86.87     542.9
## 406    901088         M      20.440        21.78         133.80    1293.0
## 407    901303         B      16.170        16.07         106.30     788.5
## 408    865137         B      11.410        10.82          73.34     403.3
## 409    864729         M      14.870        16.67          98.64     682.5
## 410    882488         B       9.567        15.91          60.21     279.6
## 411    884626         B      12.890        14.11          84.95     512.2
## 412  88199202         B      11.320        27.08          71.76     395.7
## 413    869254         B      10.750        14.97          68.26     355.3
## 414    868223         B      11.710        16.67          74.72     423.6
## 415   8912055         B      11.740        14.02          74.24     427.3
## 416    913505         M      19.440        18.82         128.10    1167.0
## 417    868682         B      11.430        15.39          73.06     399.8
## 418     89813         B      14.420        16.54          94.15     641.2
## 419   9011494         M      20.200        26.83         133.70    1234.0
## 420    869691         M      11.800        16.58          78.99     432.0
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## 421   8710441         B       9.731        15.34          63.78     300.2
## 422    857438         M      15.100        22.02          97.26     712.8
## 423     87106         B      11.150        13.08          70.87     381.9
## 424    915186         B       9.268        12.87          61.49     248.7
## 425    873843         B      11.410        14.92          73.53     402.0
## 426  85922302         M      12.680        23.84          82.69     499.0
## 427    899147         B      11.950        14.96          77.23     426.7
## 428    908469         B      14.860        16.94          94.89     673.7
## 429    924964         B      10.160        19.59          64.73     311.7
## 430    886776         M      15.320        17.27         103.20     713.3
## 431    866083         M      13.610        24.69          87.76     572.6
## 432    916799         M      18.310        20.58         120.80    1052.0
## 433   8612080         B      12.000        15.65          76.95     443.3
## 434    914769         M      18.490        17.52         121.30    1068.0
## 435    909411         B      10.970        17.20          71.73     371.5
## 436     89524         B      14.110        12.88          90.03     616.5
## 437   8911670         M      18.810        19.98         120.90    1102.0
## 438    875878         B      12.910        16.33          82.53     516.4
## 439    858477         B       8.618        11.79          54.34     224.5
## 440   8711561         B      11.750        20.18          76.10     419.8
## 441    896864         B      12.980        19.35          84.52     514.0
## 442    922576         B      13.620        23.23          87.19     573.2
## 443    862028         M      15.060        19.83         100.30     705.6
## 444    912519         B      13.470        14.06          87.32     546.3
## 445  88330202         M      17.460        39.28         113.40     920.6
## 446   8510824         B       9.504        12.44          60.34     273.9
## 447  88411702         B      13.750        23.77          88.54     590.0
## 448    895299         B      12.030        17.93          76.09     446.0
## 449   8811523         B      11.890        18.35          77.32     432.2
## 450 911296201         M      17.080        27.15         111.20     930.9
## 451  88147101         B      10.440        15.46          66.62     329.6
## 452    875263         M      12.340        26.86          81.15     477.4
## 453     90312         M      19.550        23.21         128.90    1174.0
## 454   9111596         B      11.870        21.54          76.83     432.0
## 455    905686         B      11.890        21.17          76.39     433.8
## 456  86973702         B      14.440        15.18          93.97     640.1
## 457   8610629         B      13.530        10.94          87.91     559.2
## 458  88995002         M      20.730        31.12         135.70    1419.0
## 459    872113         B       8.671        14.45          54.42     227.2
## 460    873357         B      13.010        22.22          82.01     526.4
## 461 911296202         M      27.420        26.27         186.90    2501.0
## 462    908445         M      18.820        21.97         123.70    1110.0
## 463    901836         B      11.040        14.93          70.67     372.7
## 464  90944601         B      13.780        15.79          88.37     585.9
## 465    852631         M      17.140        16.40         116.00     912.7
## 466    907915         B      12.400        17.68          81.47     467.8
## 467     89344         B      13.200        15.82          84.07     537.3
## 468   9110127         M      18.030        16.85         117.50     990.0
## 469    894604         B      10.250        16.18          66.52     324.2
## 470    909220         B      14.040        15.98          89.78     611.2
## 471    875093         B      12.770        21.41          82.02     507.4
## 472   8712291         B      14.970        19.76          95.50     690.2
## 473    854941         B      13.030        18.42          82.61     523.8
## 474  88119002         M      19.530        32.47         128.00    1223.0
## 475   9113816         B      12.040        28.14          76.85     449.9
## 476    894326         M      18.220        18.87         118.70    1027.0
## 477     90250         B      12.050        22.72          78.75     447.8
## 478 911157302         M      21.100        20.52         138.10    1384.0
## 479      8915         B      14.960        19.10          97.03     687.3
## 480     91504         M      13.820        24.49          92.33     595.9
## 481    865432         B      14.500        10.89          94.28     640.7
## 482    862548         M      14.420        19.77          94.48     642.5
## 483    853401         M      18.630        25.11         124.80    1088.0
## 484    872608         B       9.904        18.06          64.60     302.4
## 485    899187         B      11.660        17.07          73.70     421.0
## 486    899667         M      15.750        19.22         107.10     758.6
## 487   9113778         B       9.667        18.49          61.49     289.1
## 488     86355         M      22.270        19.67         152.80    1509.0
## 489    914102         B      13.160        20.54          84.06     538.7
## 490   9013838         M      11.080        18.83          73.30     361.6
## 491    914062         M      18.010        20.56         118.40    1007.0
## 492    927241         M      20.600        29.33         140.10    1265.0
## 493     87164         M      15.460        11.89         102.50     736.9
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## 493     87164         M      15.460        11.89         102.50     736.9
## 494    919537         B      10.960        17.62          70.79     365.6
## 495    858981         B       8.598        20.98          54.66     221.8
## 496    917062         B      12.880        18.22          84.45     493.1
## 497    862980         B       9.876        19.40          63.95     298.3
## 498  85638502         M      13.170        21.81          85.42     531.5
## 499  88649001         M      19.550        28.77         133.60    1207.0
## 500  88725602         M      15.530        33.56         103.70     744.9
## 501    913535         M      16.690        20.20         107.10     857.6
## 502    845636         M      16.020        23.24         102.70     797.8
## 503  84862001         M      16.130        20.68         108.10     798.8
## 504    901315         B      10.570        20.22          70.15     338.3
## 505    911366         B      11.620        18.18          76.38     408.8
## 506  88203002         B      11.220        33.81          70.79     386.8
## 507   8910721         B      14.290        16.82          90.30     632.6
## 508    915664         B      14.810        14.70          94.66     680.7
## 509    926125         M      20.920        25.09         143.00    1347.0
## 510  90602302         M      15.500        21.08         102.90     803.1
## 511   8510653         B      13.080        15.71          85.63     520.0
## 512   8911163         M      17.930        24.48         115.20     998.9
## 513    853612         M      11.840        18.70          77.93     440.6
## 514   8812816         B      13.650        13.16          87.88     568.9
## 515   9012315         M      16.350        23.29         109.00     840.4
## 516    881861         M      12.830        22.33          85.26     503.2
## 517    842517         M      20.570        17.77         132.90    1326.0
## 518  84300903         M      19.690        21.25         130.00    1203.0
## 519    857392         M      18.220        18.70         120.30    1033.0
## 520   8810158         B      13.110        22.54          87.02     529.4
## 521    907409         B      10.480        14.98          67.49     333.6
## 522     87930         B      12.470        18.60          81.09     481.9
## 523    905680         M      15.130        29.81          96.71     719.5
## 524     92751         B       7.760        24.54          47.92     181.0
## 525    862722         B       6.981        13.43          43.79     143.5
## 526   8910506         B      12.870        16.21          82.38     512.2
## 527  88147202         B      12.620        23.97          81.35     496.4
## 528    865128         M      17.950        20.01         114.20     982.0
## 529  89143601         B      11.370        18.89          72.17     396.0
## 530   9113514         B       9.668        18.10          61.06     286.3
## 531   8912909         B      11.940        20.76          77.87     441.0
## 532    921362         B       7.691        25.44          48.34     170.4
## 533  90769602         B      12.720        17.67          80.98     501.3
## 534  87281702         M      16.460        20.11         109.30     832.9
## 535    866674         M      19.790        25.12         130.40    1192.0
## 536    911408         B      12.830        15.73          82.89     506.9
## 537  85759902         B      11.520        18.75          73.34     409.0
## 538    893783         B      11.700        19.11          74.33     418.7
## 539    922297         B      13.870        20.70          89.77     584.8
## 540    862485         B      11.600        12.84          74.34     412.6
## 541    879830         M      17.010        20.26         109.70     904.3
## 542    917092         B       9.295        13.90          59.96     257.8
## 543   8912521         B      12.580        18.40          79.83     489.0
## 544    895100         M      20.340        21.51         135.90    1264.0
## 545   8610862         M      20.180        23.97         143.70    1245.0
## 546    891670         B      12.950        16.02          83.14     513.7
## 547    864726         B       8.950        15.76          58.74     245.2
## 548   9010598         B      12.760        18.84          81.87     496.6
## 549    925292         B      14.050        27.15          91.38     600.4
## 550    857155         B      12.050        14.63          78.04     449.3
## 551    905190         B      12.850        21.37          82.63     514.5
## 552    901011         B      11.140        14.07          71.24     384.6
## 553  84501001         M      12.460        24.04          83.97     475.9
## 554     91858         B      11.750        17.56          75.89     422.9
## 555   9112367         B      13.210        25.25          84.10     537.9
## 556    903516         M      21.610        22.28         144.40    1407.0
## 557  88518501         B      11.500        18.45          73.28     407.4
## 558    906564         B      14.690        13.98          98.22     656.1
## 559    871641         B      11.080        14.71          70.21     372.7
## 560   9110944         B      14.800        17.66          95.88     674.8
## 561    854268         M      14.250        21.72          93.63     633.0
## 562  89511501         B      12.200        15.21          78.01     457.9
## 563   9113156         B      14.400        26.99          92.25     646.1
## 564    894855         B      12.860        13.32          82.82     504.8
## 565 911320502         B      13.170        18.22          84.28     537.3
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## 566    898677         B      10.260        14.71          66.20     321.6
## 567    873885         M      15.280        22.41          98.92     710.6
## 568    911201         B      14.530        13.98          93.86     644.2
## 569   9012795         M      21.370        15.10         141.30    1386.0
##      smoothness_mean compactness_mean concavity_mean points_mean
## 1            0.10280          0.06981       0.0398700    0.037000
## 2            0.09688          0.11470       0.0638700    0.026420
## 3            0.10770          0.07804       0.0304600    0.024800
## 4            0.11640          0.11360       0.0463500    0.047960
## 5            0.07963          0.06934       0.0339300    0.026570
## 6            0.08546          0.07722       0.0548500    0.014280
## 7            0.09261          0.10210       0.1112000    0.041050
## 8            0.13230          0.17680       0.1558000    0.091760
## 9            0.09989          0.08578       0.0299500    0.012010
## 10           0.10330          0.09097       0.0539700    0.033410
## 11           0.10850          0.16440       0.2188000    0.112100
## 12           0.08654          0.06679       0.0388500    0.023310
## 13           0.08675          0.10890       0.1085000    0.035100
## 14           0.08060          0.03789       0.0006920    0.004167
## 15           0.10320          0.09871       0.1655000    0.090630
## 16           0.08473          0.13300       0.1029000    0.037360
## 17           0.09462          0.09462       0.0713500    0.059330
## 18           0.10280          0.07664       0.0319300    0.021070
## 19           0.10800          0.18380       0.2283000    0.128000
## 20           0.10660          0.09509       0.0285500    0.028820
## 21           0.09774          0.06141       0.0380900    0.032390
## 22           0.12360          0.15520       0.0451500    0.045310
## 23           0.10040          0.07460       0.0494400    0.029320
## 24           0.11500          0.18070       0.1138000    0.085340
## 25           0.11220          0.13030       0.0647600    0.030680
## 26           0.10070          0.12800       0.0778900    0.050690
## 27           0.10220          0.08165       0.0397400    0.027800
## 28           0.10820          0.16970       0.1683000    0.087510
## 29           0.08481          0.09228       0.0842200    0.022920
## 30           0.07937          0.05696       0.0218100    0.014730
## 31           0.08352          0.03735       0.0045590    0.008829
## 32           0.09055          0.05761       0.0471100    0.027040
## 33           0.09289          0.20040       0.2136000    0.100200
## 34           0.08685          0.06526       0.0321100    0.026530
## 35           0.09832          0.08918       0.0822200    0.043490
## 36           0.08268          0.07548       0.0424900    0.024710
## 37           0.09009          0.10290       0.1080000    0.079510
## 38           0.11520          0.12960       0.0371000    0.030030
## 39           0.08865          0.09182       0.0842200    0.065760
## 40           0.10660          0.18020       0.1948000    0.090520
## 41           0.10000          0.10880       0.1519000    0.093330
## 42           0.11200          0.16660       0.2508000    0.128600
## 43           0.14250          0.28390       0.2414000    0.105200
## 44           0.09462          0.09965       0.0373800    0.020980
## 45           0.06828          0.05319       0.0222400    0.013390
## 46           0.07371          0.08642       0.1103000    0.057780
## 47           0.08151          0.03834       0.0136900    0.013700
## 48           0.11490          0.23630       0.3368000    0.191300
## 49           0.10590          0.11470       0.0858000    0.053810
## 50           0.08451          0.10140       0.0683000    0.030990
## 51           0.10260          0.15170       0.0990100    0.056020
## 52           0.08371          0.10960       0.0650500    0.037800
## 53           0.09087          0.06232       0.0285300    0.016380
## 54           0.08223          0.10390       0.1103000    0.044080
## 55           0.11410          0.20840       0.3523000    0.162000
## 56           0.10780          0.15350       0.1169000    0.069870
## 57           0.08099          0.09661       0.0672600    0.026390
## 58           0.09267          0.04695       0.0015970    0.002404
## 59           0.14470          0.28670       0.4268000    0.201200
## 60           0.10370          0.14420       0.1626000    0.094640
## 61           0.09081          0.21900       0.2107000    0.099610
## 62           0.10490          0.16030       0.2159000    0.104300
## 63           0.10060          0.11460       0.1682000    0.065970
## 64           0.08162          0.06031       0.0311000    0.020310
## 65           0.10730          0.21350       0.2077000    0.097560
## 66           0.10120          0.10150       0.0537000    0.028220
## 67           0.08445          0.04994       0.0355400    0.024560
## 68           0.07618          0.03515       0.0144700    0.018770
```

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## 69          0.09516          0.07688      0.0447900    0.037110
## 70          0.10160          0.09453      0.0420000    0.021570
## 71          0.10160          0.12550      0.1063000    0.054390
## 72          0.10070          0.07326      0.0251100    0.017750
## 73          0.09968          0.19720      0.1975000    0.049080
## 74          0.07838          0.06217      0.0444500    0.041780
## 75          0.07445          0.07223      0.0515000    0.027710
## 76          0.08772          0.09445      0.0601500    0.037450
## 77          0.08588          0.08468      0.0816900    0.058140
## 78          0.08139          0.04701      0.0370900    0.022300
## 79          0.08794          0.07948      0.0405200    0.025480
## 80          0.10360          0.13040      0.1201000    0.088240
## 81          0.09855          0.07885      0.0260200    0.037810
## 82          0.08080          0.07253      0.0384400    0.016540
## 83          0.08582          0.06373      0.0334400    0.024240
## 84          0.11320          0.13390      0.0996600    0.070640
## 85          0.12370          0.11110      0.0790000    0.055500
## 86          0.06955          0.03729      0.0226000    0.011710
## 87          0.09003          0.06307      0.0295800    0.026470
## 88          0.09245          0.07426      0.0281900    0.032640
## 89          0.09428          0.10220      0.1097000    0.086320
## 90          0.09916          0.10700      0.0538500    0.037830
## 91          0.08739          0.03774      0.0091930    0.013300
## 92          0.08928          0.07630      0.0360900    0.023690
## 93          0.07840          0.05616      0.0420900    0.028470
## 94          0.08369          0.05073      0.0120600    0.017620
## 95          0.10750          0.24130      0.1981000    0.066180
## 96          0.09491          0.13710      0.1204000    0.070410
## 97          0.07351          0.07899      0.0405700    0.018830
## 98          0.08372          0.05642      0.0268800    0.022800
## 99          0.10610          0.08502      0.0176800    0.019150
## 100         0.10630          0.26650      0.3339000    0.184500
## 101         0.10820          0.12890      0.0844800    0.028670
## 102         0.06950          0.02344      0.0000000    0.000000
## 103         0.09834          0.07608      0.0326500    0.027550
## 104         0.09867          0.07200      0.0739500    0.052590
## 105         0.07215          0.04524      0.0433600    0.011050
## 106         0.10460          0.08228      0.0530800    0.019690
## 107         0.08760          0.10380      0.1030000    0.043910
## 108         0.10960          0.11520      0.0817500    0.021660
## 109         0.08192          0.06602      0.0154800    0.008160
## 110         0.10180          0.05978      0.0089550    0.010760
## 111         0.11420          0.10170      0.0707000    0.034850
## 112         0.09405          0.13050      0.1321000    0.021680
## 113         0.10540          0.11000      0.1457000    0.086650
## 114         0.11310          0.22930      0.2128000    0.080250
## 115         0.08637          0.04966      0.0165700    0.011150
## 116         0.08331          0.11090      0.1204000    0.057360
## 117         0.09872          0.12060      0.1180000    0.059800
## 118         0.11600          0.15620      0.1891000    0.091130
## 119         0.09383          0.13060      0.1272000    0.086910
## 120         0.10820          0.13040      0.0960300    0.056030
## 121         0.08785          0.06136      0.0142000    0.011410
## 122         0.09090          0.13480      0.1640000    0.095610
## 123         0.07474          0.05688      0.0197400    0.013130
## 124         0.09384          0.08562      0.1168000    0.084650
## 125         0.09076          0.05886      0.0258700    0.023220
## 126         0.08853          0.07694      0.0334400    0.015020
## 127         0.13980          0.17650      0.2071000    0.096010
## 128         0.08682          0.06636      0.0839000    0.052710
## 129         0.08217          0.08028      0.0927100    0.056270
## 130         0.10380          0.11540      0.1463000    0.061390
## 131         0.09947          0.22250      0.2733000    0.097110
## 132         0.09057          0.11470      0.0965700    0.048120
## 133         0.08671          0.06877      0.0298700    0.032750
## 134         0.11100          0.11590      0.2439000    0.138900
## 135         0.11940          0.10710      0.0406300    0.042680
## 136         0.11210          0.14570      0.1525000    0.091700
## 137         0.10390          0.07428      0.0000000    0.000000
## 138         0.09311          0.05241      0.0197200    0.019630
## 139         0.11190          0.10560      0.1508000    0.099340
## 140         0.08261          0.04751      0.0197200    0.013490
## 141         0.09440          0.10660      0.1490000    0.077310
```

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## 141         0.09440         0.10660      0.1490000    0.077310
## 142         0.11840         0.27760      0.3001000    0.147100
## 143         0.09780         0.10340      0.1440000    0.097910
## 144         0.10490         0.20080      0.2135000    0.086530
## 145         0.10540         0.18680      0.1425000    0.087830
## 146         0.10070         0.05562      0.0235300    0.015530
## 147         0.09710         0.12920      0.0995400    0.066060
## 148         0.09686         0.08468      0.0586200    0.048350
## 149         0.07557         0.03454      0.0134200    0.016990
## 150         0.08477         0.06815      0.0264300    0.019210
## 151         0.08511         0.03834      0.0044730    0.006423
## 152         0.10750         0.08333      0.0089340    0.019670
## 153         0.08677         0.09509      0.0489400    0.030880
## 154         0.09434         0.04994      0.0101200    0.005495
## 155         0.08757         0.16760      0.1362000    0.066020
## 156         0.10090         0.05956      0.0271000    0.014060
## 157         0.07948         0.04052      0.0199700    0.012380
## 158         0.12270         0.12180      0.1044000    0.056690
## 159         0.08142         0.04462      0.0199300    0.011110
## 160         0.08752         0.07698      0.0475100    0.033840
## 161         0.07355         0.05055      0.0326100    0.026480
## 162         0.08020         0.11810      0.0927400    0.055880
## 163         0.08743         0.05492      0.0150200    0.020880
## 164         0.07005         0.03116      0.0036810    0.003472
## 165         0.09342         0.12750      0.1676000    0.100300
## 166         0.10940         0.19140      0.2871000    0.187800
## 167         0.09906         0.07624      0.0572400    0.046030
## 168         0.08999         0.12730      0.0969700    0.075070
## 169         0.09384         0.08498      0.0929300    0.034830
## 170         0.07944         0.06376      0.0288100    0.013290
## 171         0.11580         0.12310      0.1226000    0.073400
## 172         0.10600         0.11330      0.1126000    0.064630
## 173         0.11890         0.16450      0.0936600    0.059850
## 174         0.07956         0.08259      0.0407200    0.021420
## 175         0.09048         0.06288      0.0585800    0.034380
## 176         0.09934         0.09546      0.0388900    0.023150
## 177         0.10530         0.12670      0.1323000    0.089940
## 178         0.07741         0.04768      0.0271200    0.007246
## 179         0.10990         0.16860      0.1974000    0.100900
## 180         0.08013         0.04038      0.0238300    0.017700
## 181         0.09586         0.08087      0.0418700    0.041070
## 182         0.09168         0.08424      0.0976900    0.066380
## 183         0.09198         0.06221      0.0106300    0.019170
## 184         0.08876         0.09588      0.0755000    0.040790
## 185         0.10540         0.06779      0.0050060    0.007583
## 186         0.08518         0.04721      0.0123600    0.013690
## 187         0.11410         0.15720      0.1910000    0.109000
## 188         0.09430         0.09709      0.1153000    0.068470
## 189         0.08020         0.08564      0.1155000    0.077260
## 190         0.09037         0.04689      0.0110300    0.014070
## 191         0.09721         0.11370      0.0944700    0.059430
## 192         0.08872         0.05242      0.0260600    0.017960
## 193         0.08098         0.08549      0.0553900    0.032210
## 194         0.11390         0.15950      0.1639000    0.073640
## 195         0.09597         0.08799      0.0659300    0.051890
## 196         0.12150         0.17910      0.1937000    0.146900
## 197         0.10240         0.09769      0.1235000    0.065530
## 198         0.08974         0.08606      0.0310200    0.029570
## 199         0.10750         0.11380      0.0420100    0.031520
## 200         0.08108         0.07823      0.0683900    0.025340
## 201         0.09387         0.05131      0.0239800    0.028990
## 202         0.08801         0.05743      0.0361400    0.014040
## 203         0.08515         0.10250      0.0685900    0.038760
## 204         0.09933         0.12090      0.1065000    0.060210
## 205         0.11500         0.07281      0.0400600    0.032500
## 206         0.11830         0.18700      0.2030000    0.085200
## 207         0.08508         0.05855      0.0336700    0.017770
## 208         0.09968         0.05914      0.0268500    0.035150
## 209         0.07376         0.03614      0.0027580    0.004419
## 210         0.11410         0.28320      0.2487000    0.149600
## 211         0.07818         0.09580      0.1115000    0.033900
## 212         0.11370         0.13650      0.1293000    0.081230
## 213         0.10710         0.18300      0.1692000    0.079440
```

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## 214         0.08363          0.08575      0.0507700    0.028640
## 215         0.10070          0.10690      0.0511500    0.015710
## 216         0.11340          0.08061      0.0108400    0.012900
## 217         0.11250          0.11170      0.0388000    0.029950
## 218         0.08931          0.11080      0.0506300    0.030580
## 219         0.12780          0.17000      0.1578000    0.080890
## 220         0.08439          0.11450      0.1324000    0.097020
## 221         0.09667          0.08393      0.0128800    0.019240
## 222         0.08785          0.05794      0.0236000    0.024020
## 223         0.11500          0.16420      0.2197000    0.106200
## 224         0.11020          0.09362      0.0459100    0.022330
## 225         0.08792          0.04302      0.0000000    0.000000
## 226         0.10740          0.05847      0.0000000    0.000000
## 227         0.12550          0.22040      0.1188000    0.070380
## 228         0.11330          0.14890      0.2133000    0.125900
## 229         0.08968          0.11980      0.1036000    0.074880
## 230         0.08306          0.04458      0.0009737    0.002941
## 231         0.09357          0.08574      0.0716000    0.020170
## 232         0.08682          0.04571      0.0210900    0.020540
## 233         0.07837          0.22330      0.3003000    0.077980
## 234         0.11690          0.13190      0.1478000    0.084880
## 235         0.08276          0.04234      0.0199700    0.014990
## 236         0.11280          0.09263      0.0427900    0.031320
## 237         0.10440          0.19800      0.1697000    0.088780
## 238         0.10360          0.07632      0.0256500    0.015100
## 239         0.09657          0.07234      0.0237900    0.016150
## 240         0.10700          0.05971      0.0483100    0.030700
## 241         0.10960          0.12790      0.0978900    0.052460
## 242         0.11500          0.08201      0.0413200    0.019240
## 243         0.07969          0.06053      0.0373500    0.005128
## 244         0.08662          0.06290      0.0289100    0.028370
## 245         0.10620          0.18490      0.2417000    0.097400
## 246         0.08491          0.05030      0.0233700    0.009615
## 247         0.08117          0.03912      0.0024700    0.005159
## 248         0.08837          0.12300      0.1009000    0.038900
## 249         0.08600          0.05943      0.0158800    0.005917
## 250         0.08437          0.06450      0.0405500    0.019450
## 251         0.09883          0.13640      0.0772100    0.061420
## 252         0.11090          0.31140      0.3176000    0.137700
## 253         0.08365          0.11140      0.1007000    0.027570
## 254         0.12300          0.25760      0.3189000    0.119800
## 255         0.12480          0.09755      0.1010000    0.066150
## 256         0.10440          0.06159      0.0204700    0.012570
## 257         0.08388          0.07800      0.0881700    0.029250
## 258         0.08858          0.05313      0.0278300    0.021000
## 259         0.09831          0.05234      0.0365300    0.028640
## 260         0.09779          0.08129      0.0666400    0.047810
## 261         0.10290          0.09758      0.0478300    0.033260
## 262         0.09030          0.07658      0.0599900    0.027380
## 263         0.10920          0.12230      0.1466000    0.080870
## 264         0.07991          0.05326      0.0299500    0.020700
## 265         0.11970          0.14960      0.2417000    0.120300
## 266         0.12730          0.19320      0.1859000    0.093530
## 267         0.08054          0.05907      0.0577400    0.010710
## 268         0.09783          0.15310      0.0860600    0.028720
## 269         0.08192          0.05200      0.0171400    0.012610
## 270         0.10270          0.15580      0.2049000    0.088860
## 271         0.08044          0.08895      0.0739000    0.040830
## 272         0.09740          0.24580      0.2065000    0.111800
## 273         0.08045          0.05361      0.0268100    0.032510
## 274         0.09172          0.06829      0.0337200    0.022720
## 275         0.08523          0.14280      0.1114000    0.067720
## 276         0.11420          0.15160      0.3201000    0.159500
## 277         0.09587          0.08345      0.0682400    0.049510
## 278         0.08455          0.10230      0.0925100    0.053020
## 279         0.07431          0.04227      0.0000000    0.000000
## 280         0.08098          0.04878      0.0000000    0.000000
## 281         0.10650          0.21460      0.1684000    0.108000
## 282         0.08511          0.04413      0.0050670    0.005664
## 283         0.08386          0.05794      0.0075100    0.008488
## 284         0.09423          0.06630      0.0470500    0.037310
## 285         0.09726          0.08995      0.0906100    0.065270
## 286         0.08641          0.06698      0.0519200    0.027910
```

```
## 287         0.09463          0.13060      0.1115000    0.064620
## 288         0.10370          0.13100      0.1411000    0.094310
## 289         0.10070          0.16060      0.2712000    0.131000
## 290         0.10760          0.13340      0.0801700    0.050740
## 291         0.08123          0.04971      0.0000000    0.000000
## 292         0.08302          0.06374      0.0255600    0.020310
## 293         0.12000          0.12670      0.1385000    0.065260
## 294         0.09231          0.07175      0.0439200    0.020270
## 295         0.10630          0.19540      0.2448000    0.150100
## 296         0.10300          0.21060      0.2310000    0.147100
## 297         0.10460          0.17390      0.2085000    0.132200
## 298         0.09831          0.10270      0.1479000    0.094980
## 299         0.11000          0.09009      0.0378100    0.027980
## 300         0.10260          0.18930      0.2236000    0.091940
## 301         0.08694          0.11850      0.1193000    0.096670
## 302         0.06576          0.05220      0.0247500    0.013740
## 303         0.07515          0.03718      0.0030900    0.006588
## 304         0.11060          0.14690      0.1445000    0.081720
## 305         0.10250          0.12040      0.1147000    0.064620
## 306         0.09159          0.10740      0.1554000    0.083400
## 307         0.10480          0.20870      0.2550000    0.094290
## 308         0.09879          0.08836      0.0329600    0.023900
## 309         0.08138          0.11670      0.0905000    0.035620
## 310         0.10510          0.11920      0.0786000    0.044510
## 311         0.09156          0.13130      0.1523000    0.101500
## 312         0.10080          0.10410      0.1266000    0.083530
## 313         0.09950          0.07957      0.0454800    0.031600
## 314         0.12250          0.07210      0.0592900    0.074040
## 315         0.10410          0.14360      0.0984700    0.061580
## 316         0.07517          0.04726      0.0127100    0.011170
## 317         0.10030          0.13280      0.1980000    0.104300
## 318         0.09509          0.16820      0.1950000    0.123700
## 319         0.09566          0.08194      0.0482400    0.022570
## 320         0.08875          0.07780      0.0460800    0.035280
## 321         0.09514          0.15110      0.1544000    0.048460
## 322         0.09610          0.13360      0.1348000    0.060180
## 323         0.09078          0.13130      0.1465000    0.086830
## 324         0.09768          0.07849      0.0332800    0.020080
## 325         0.07926          0.03393      0.0105300    0.011080
## 326         0.09874          0.10530      0.1335000    0.087950
## 327         0.09070          0.06945      0.0146200    0.018960
## 328         0.11550          0.17520      0.2133000    0.094790
## 329         0.11350          0.07589      0.0313600    0.026450
## 330         0.10690          0.12830      0.2308000    0.141000
## 331         0.09250          0.04102      0.0000000    0.000000
## 332         0.09136          0.07883      0.0179700    0.020900
## 333         0.09594          0.05736      0.0253100    0.016980
## 334         0.07734          0.03212      0.0112300    0.005051
## 335         0.11670          0.13050      0.1539000    0.086240
## 336         0.08182          0.06230      0.0589200    0.031570
## 337         0.07436          0.02650      0.0011940    0.005449
## 338         0.10660          0.14130      0.3130000    0.043750
## 339         0.09116          0.14020      0.1060000    0.060900
## 340         0.10430          0.12990      0.1191000    0.062110
## 341         0.09495          0.08501      0.0550000    0.045280
## 342         0.09029          0.12060      0.1468000    0.082710
## 343         0.11650          0.12830      0.1799000    0.079810
## 344         0.09592          0.13250      0.1548000    0.028540
## 345         0.10080          0.12840      0.1043000    0.056130
## 346         0.10370          0.08404      0.0433400    0.017780
## 347         0.08293          0.07698      0.0472100    0.023810
## 348         0.10920          0.09486      0.0203100    0.018610
## 349         0.09215          0.08597      0.0748600    0.043350
## 350         0.10300          0.09218      0.0544100    0.042740
## 351         0.07966          0.05581      0.0208700    0.026520
## 352         0.09847          0.11570      0.0987500    0.079530
## 353         0.08123          0.05824      0.0619500    0.023430
## 354         0.08759          0.06575      0.0513300    0.018990
## 355         0.11720          0.14790      0.1267000    0.090290
## 356         0.10440          0.07773      0.0217200    0.015040
## 357         0.10890          0.07232      0.0175600    0.019520
## 358         0.08871          0.06900      0.0266900    0.013930
## 359         0.09463          0.10900      0.1127000    0.074000
```

```
## 359         0.09463          0.10900      0.1127000    0.074000
## 360         0.09240          0.05605      0.0399600    0.012820
## 361         0.08355          0.08348      0.0904200    0.060220
## 362         0.08401          0.10020      0.0993800    0.053640
## 363         0.07699          0.03398      0.0000000    0.000000
## 364         0.09996          0.07542      0.0192300    0.019680
## 365         0.10450          0.07057      0.0249000    0.029410
## 366         0.09984          0.11200      0.0673700    0.025940
## 367         0.11150          0.16650      0.1855000    0.105400
## 368         0.07984          0.04626      0.0154100    0.010430
## 369         0.08597          0.05969      0.0136700    0.008907
## 370         0.10350          0.11880      0.1379000    0.085910
## 371         0.11580          0.10850      0.0592800    0.032790
## 372         0.07721          0.08751      0.0598800    0.021800
## 373         0.08313          0.04202      0.0077560    0.008535
## 374         0.09087          0.07838      0.0291600    0.015270
## 375         0.08583          0.05430      0.0296600    0.022720
## 376         0.07372          0.04043      0.0071730    0.011490
## 377         0.08275          0.07214      0.0410500    0.030270
## 378         0.10420          0.12970      0.0589200    0.028800
## 379         0.09379          0.03872      0.0014870    0.003333
## 380         0.10130          0.07808      0.0432800    0.029290
## 381         0.08684          0.06330      0.0134200    0.022930
## 382         0.10150          0.06797      0.0249500    0.018750
## 383         0.09444          0.09947      0.1204000    0.049380
## 384         0.10400          0.15590      0.1354000    0.077520
## 385         0.10490          0.08499      0.0430200    0.025940
## 386         0.08877          0.08066      0.0435800    0.024380
## 387         0.09401          0.19610      0.2195000    0.108800
## 388         0.10680          0.06678      0.0229700    0.017800
## 389         0.09488          0.08511      0.0862500    0.044890
## 390         0.09427          0.06712      0.0552600    0.045630
## 391         0.09997          0.13140      0.1698000    0.082930
## 392         0.07449          0.03558      0.0000000    0.000000
## 393         0.07685          0.06059      0.0185700    0.017230
## 394         0.10200          0.14530      0.1921000    0.096640
## 395         0.09277          0.07255      0.0175200    0.018800
## 396         0.07026          0.04831      0.0204500    0.008507
## 397         0.10880          0.11680      0.0709700    0.044970
## 398         0.09200          0.10360      0.1122000    0.074830
## 399         0.09797          0.13390      0.1863000    0.110300
## 400         0.10240          0.05301      0.0068290    0.007937
## 401         0.09492          0.08419      0.0233000    0.024160
## 402         0.07115          0.07325      0.0809200    0.028000
## 403         0.09401          0.17190      0.1657000    0.075930
## 404         0.09446          0.10760      0.1527000    0.089410
## 405         0.08284          0.12230      0.1010000    0.028330
## 406         0.09150          0.11310      0.0979900    0.077850
## 407         0.09880          0.14380      0.0665100    0.053970
## 408         0.09373          0.06685      0.0351200    0.026230
## 409         0.11620          0.16490      0.1690000    0.089230
## 410         0.08464          0.04087      0.0165200    0.016670
## 411         0.08760          0.13460      0.1374000    0.039800
## 412         0.06883          0.03813      0.0163300    0.003125
## 413         0.07793          0.05139      0.0225100    0.007875
## 414         0.10510          0.06095      0.0359200    0.026000
## 415         0.07813          0.04340      0.0224500    0.027630
## 416         0.10890          0.14480      0.2256000    0.119400
## 417         0.09639          0.06889      0.0350300    0.028750
## 418         0.09751          0.11390      0.0800700    0.042230
## 419         0.09905          0.16690      0.1641000    0.126500
## 420         0.10910          0.17000      0.1659000    0.074150
## 421         0.10720          0.15990      0.4108000    0.078570
## 422         0.09056          0.07081      0.0525300    0.033340
## 423         0.09754          0.05113      0.0198200    0.017860
## 424         0.16340          0.22390      0.0973000    0.052520
## 425         0.09059          0.08155      0.0618100    0.023610
## 426         0.11220          0.12620      0.1128000    0.068730
## 427         0.11580          0.12060      0.0117100    0.017870
## 428         0.08924          0.07074      0.0334600    0.028770
## 429         0.10030          0.07504      0.0050250    0.011160
## 430         0.13350          0.22840      0.2448000    0.124200
## 431         0.09258          0.07862      0.0528500    0.030850
```

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## 432         0.10680          0.12480      0.1569000    0.094510
## 433         0.09723          0.07165      0.0415100    0.018630
## 434         0.10120          0.13170      0.1491000    0.091830
## 435         0.08915          0.11130      0.0945700    0.036130
## 436         0.09309          0.05306      0.0176500    0.027330
## 437         0.08923          0.05884      0.0802000    0.058430
## 438         0.07941          0.05366      0.0387300    0.023770
## 439         0.09752          0.05272      0.0206100    0.007799
## 440         0.10890          0.11410      0.0684300    0.037380
## 441         0.09579          0.11250      0.0710700    0.029500
## 442         0.09246          0.06747      0.0297400    0.024430
## 443         0.10390          0.15530      0.1700000    0.088150
## 444         0.10710          0.11550      0.0578600    0.052660
## 445         0.09812          0.12980      0.1417000    0.088110
## 446         0.10240          0.06492      0.0295600    0.020760
## 447         0.08043          0.06807      0.0469700    0.023440
## 448         0.07683          0.03892      0.0015460    0.005592
## 449         0.09363          0.11540      0.0663600    0.031420
## 450         0.09898          0.11100      0.1007000    0.064310
## 451         0.10530          0.07722      0.0066430    0.012160
## 452         0.10340          0.13530      0.1085000    0.045620
## 453         0.10100          0.13180      0.1856000    0.102100
## 454         0.06613          0.10640      0.0877700    0.023860
## 455         0.09773          0.08120      0.0255500    0.021790
## 456         0.09970          0.10210      0.0848700    0.055320
## 457         0.12910          0.10470      0.0687700    0.065560
## 458         0.09469          0.11430      0.1367000    0.086460
## 459         0.09138          0.04276      0.0000000    0.000000
## 460         0.06251          0.01938      0.0015950    0.001852
## 461         0.10840          0.19880      0.3635000    0.168900
## 462         0.10180          0.13890      0.1594000    0.087440
## 463         0.07987          0.07079      0.0354600    0.020740
## 464         0.08817          0.06718      0.0105500    0.009937
## 465         0.11860          0.22760      0.2229000    0.140100
## 466         0.10540          0.13160      0.0774100    0.027990
## 467         0.08511          0.05251      0.0014610    0.003261
## 468         0.08947          0.12320      0.1090000    0.062540
## 469         0.10610          0.11110      0.0672600    0.039650
## 470         0.08458          0.05895      0.0353400    0.029440
## 471         0.08749          0.06601      0.0311200    0.028640
## 472         0.08421          0.05352      0.0194700    0.019390
## 473         0.08983          0.03766      0.0256200    0.029230
## 474         0.08420          0.11300      0.1145000    0.066370
## 475         0.08752          0.06000      0.0236700    0.023770
## 476         0.09746          0.11170      0.1130000    0.079500
## 477         0.06935          0.10730      0.0794300    0.029780
## 478         0.09684          0.11750      0.1572000    0.115500
## 479         0.08992          0.09823      0.0594000    0.048190
## 480         0.11620          0.16810      0.1357000    0.067590
## 481         0.11010          0.10990      0.0884200    0.057780
## 482         0.09752          0.11410      0.0938800    0.058390
## 483         0.10640          0.18870      0.2319000    0.124400
## 484         0.09699          0.12940      0.1307000    0.037160
## 485         0.07561          0.03630      0.0083060    0.011620
## 486         0.12430          0.23640      0.2914000    0.124200
## 487         0.08946          0.06258      0.0294800    0.015140
## 488         0.13260          0.27680      0.4264000    0.182300
## 489         0.07335          0.05275      0.0180000    0.012560
## 490         0.12160          0.21540      0.1689000    0.063670
## 491         0.10010          0.12890      0.1170000    0.077620
## 492         0.11780          0.27700      0.3514000    0.152000
## 493         0.12570          0.15550      0.2032000    0.109700
## 494         0.09687          0.09752      0.0526300    0.027880
## 495         0.12430          0.08963      0.0300000    0.009259
## 496         0.12180          0.16610      0.0482500    0.053030
## 497         0.10050          0.09697      0.0615400    0.030290
## 498         0.09714          0.10470      0.0825900    0.052520
## 499         0.09260          0.20630      0.1784000    0.114400
## 500         0.10630          0.16390      0.1751000    0.083990
## 501         0.07497          0.07112      0.0364900    0.023070
## 502         0.08206          0.06669      0.0329900    0.033230
## 503         0.11700          0.20220      0.1722000    0.102800
## 504         0.09073          0.16600      0.2280000    0.059410
```

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## 505         0.11750          0.14830      0.1020000    0.055640
## 506         0.07780          0.03574      0.0049670    0.006434
## 507         0.06429          0.02675      0.0072500    0.006250
## 508         0.08472          0.05016      0.0341600    0.025410
## 509         0.10990          0.22360      0.3174000    0.147400
## 510         0.11200          0.15710      0.1522000    0.084810
## 511         0.10750          0.12700      0.0456800    0.031100
## 512         0.08855          0.07027      0.0569900    0.047440
## 513         0.11090          0.15160      0.1218000    0.051820
## 514         0.09646          0.08711      0.0388800    0.025630
## 515         0.09742          0.14970      0.1811000    0.087730
## 516         0.10880          0.17990      0.1695000    0.068610
## 517         0.08474          0.07864      0.0869000    0.070170
## 518         0.10960          0.15990      0.1974000    0.127900
## 519         0.11480          0.14850      0.1772000    0.106000
## 520         0.10020          0.14830      0.0870500    0.051020
## 521         0.09816          0.10130      0.0633500    0.022180
## 522         0.09965          0.10580      0.0800500    0.038210
## 523         0.08320          0.04605      0.0468600    0.027390
## 524         0.05263          0.04362      0.0000000    0.000000
## 525         0.11700          0.07568      0.0000000    0.000000
## 526         0.09425          0.06219      0.0390000    0.016150
## 527         0.07903          0.07529      0.0543800    0.020360
## 528         0.08402          0.06722      0.0729300    0.055960
## 529         0.08713          0.05008      0.0239900    0.021730
## 530         0.08311          0.05428      0.0147900    0.005769
## 531         0.08605          0.10110      0.0657400    0.037910
## 532         0.08668          0.11990      0.0925200    0.013640
## 533         0.07896          0.04522      0.0140200    0.018350
## 534         0.09831          0.15560      0.1793000    0.088660
## 535         0.10150          0.15890      0.2545000    0.114900
## 536         0.09040          0.08269      0.0583500    0.030780
## 537         0.09524          0.05473      0.0303600    0.022780
## 538         0.08814          0.05253      0.0158300    0.011480
## 539         0.09578          0.10180      0.0368800    0.023690
## 540         0.08983          0.07525      0.0419600    0.033500
## 541         0.08772          0.07304      0.0695000    0.053900
## 542         0.13710          0.12250      0.0333200    0.024210
## 543         0.08393          0.04216      0.0018600    0.002924
## 544         0.11700          0.18750      0.2565000    0.150400
## 545         0.12860          0.34540      0.3754000    0.160400
## 546         0.10050          0.07943      0.0615500    0.033700
## 547         0.09462          0.12430      0.0926300    0.023080
## 548         0.09676          0.07952      0.0268800    0.017810
## 549         0.09929          0.11260      0.0446200    0.043040
## 550         0.10310          0.09092      0.0659200    0.027490
## 551         0.07551          0.08316      0.0612600    0.018670
## 552         0.07274          0.06064      0.0450500    0.014710
## 553         0.11860          0.23960      0.2273000    0.085430
## 554         0.10730          0.09713      0.0528200    0.044400
## 555         0.08791          0.05205      0.0277200    0.020680
## 556         0.11670          0.20870      0.2810000    0.156200
## 557         0.09345          0.05991      0.0263800    0.020690
## 558         0.10310          0.18360      0.1450000    0.063000
## 559         0.10060          0.05743      0.0236300    0.025830
## 560         0.09179          0.08890      0.0406900    0.022600
## 561         0.09823          0.10980      0.1319000    0.055980
## 562         0.08673          0.06545      0.0199400    0.016920
## 563         0.06995          0.05223      0.0347600    0.017370
## 564         0.11340          0.08834      0.0380000    0.034000
## 565         0.07466          0.05994      0.0485900    0.028700
## 566         0.09882          0.09159      0.0358100    0.020370
## 567         0.09057          0.10520      0.0537500    0.032630
## 568         0.10990          0.09242      0.0689500    0.064950
## 569         0.10010          0.15150      0.1932000    0.125500
##     symmetry_mean dimension_mean radius_se texture_se perimeter_se area_se
## 1          0.1959        0.05955    0.2360     0.6656       1.6700  17.430
## 2          0.1922        0.06491    0.4505     1.1970       3.4300  27.100
## 3          0.1714        0.06340    0.1967     1.3870       1.3420  13.540
## 4          0.1771        0.06072    0.3384     1.3430       1.8510  26.330
## 5          0.1721        0.05544    0.1783     0.4125       1.3380  17.720
## 6          0.2031        0.06267    0.2864     1.4400       2.2060  20.300
## 7          0.1388        0.06570    0.2388     2.9040       1.9360  16.970
```

```
## 7         0.1588       0.06570    0.2388     2.9040       1.9360  16.970
## 8         0.2251       0.07421    0.5648     1.9300       3.9090  52.720
## 9         0.2217       0.06481    0.3550     1.5340       2.3020  23.130
## 10        0.1776       0.06907    0.1601     0.8225       1.3550  10.800
## 11        0.1848       0.06222    0.5904     1.2160       4.2060  75.090
## 12        0.1970       0.06228    0.2200     0.9823       1.4840  16.510
## 13        0.1562       0.06020    0.3152     0.7884       2.3120  27.400
## 14        0.1819       0.05501    0.4040     1.2140       2.5950  32.960
## 15        0.1663       0.05391    0.4674     1.3750       2.9160  56.180
## 16        0.1454       0.06147    0.2254     1.1080       2.2240  19.540
## 17        0.1816       0.05723    0.3117     0.8155       1.9720  27.940
## 18        0.1707       0.05984    0.2100     0.9505       1.5660  17.610
## 19        0.2249       0.07469    1.0720     1.7430       7.8040 130.800
## 20        0.1880       0.06471    0.2005     0.8163       1.9730  15.240
## 21        0.1516       0.06095    0.2451     0.7655       1.7420  17.860
## 22        0.2131       0.07405    0.2957     1.9780       2.1580  20.950
## 23        0.1486       0.06615    0.3796     1.7430       3.0180  25.780
## 24        0.2001       0.06467    0.4309     1.0680       2.7960  39.840
## 25        0.1922       0.07782    0.3336     1.8600       2.0410  19.910
## 26        0.1662       0.06566    0.2787     0.6205       1.9570  23.350
## 27        0.1638       0.05710    0.2950     1.3730       2.0990  25.220
## 28        0.1926       0.06540    0.4390     1.0120       3.4980  43.500
## 29        0.2036       0.07125    0.1844     0.9429       1.4290  12.070
## 30        0.1650       0.05701    0.1584     0.6124       1.0360  13.220
## 31        0.1453       0.05518    0.3975     0.8285       2.5670  33.010
## 32        0.1585       0.06065    0.2367     1.3800       1.4570  19.870
## 33        0.1696       0.07369    0.9289     1.4650       5.8010 104.900
## 34        0.1966       0.05597    0.3342     1.7810       2.0790  25.790
## 35        0.1739       0.05640    0.4165     0.6237       2.5610  37.110
## 36        0.1792       0.05897    0.1402     0.5417       1.1010  11.350
## 37        0.1582       0.05461    0.7888     0.7975       5.4860  96.050
## 38        0.1995       0.07839    0.3962     0.6538       3.0210  25.030
## 39        0.1893       0.05534    0.5990     1.3910       4.1290  67.340
## 40        0.1876       0.06684    0.2873     0.9173       2.4640  28.090
## 41        0.1814       0.05572    0.3977     1.0330       2.5870  52.340
## 42        0.2027       0.06082    0.7364     1.0480       4.7920  97.070
## 43        0.2597       0.09744    0.4956     1.1560       3.4450  27.230
## 44        0.1652       0.07238    0.1814     0.6412       0.9219  14.410
## 45        0.1813       0.05536    0.1555     0.5762       1.3920  14.030
## 46        0.1770       0.05340    0.6362     1.3050       4.3120  76.360
## 47        0.1511       0.06148    0.1415     0.9671       0.9680   9.704
## 48        0.1956       0.06121    0.9948     0.8509       7.2220 153.100
## 49        0.1806       0.06079    0.2136     1.3320       1.5130  19.290
## 50        0.1781       0.06249    0.3642     1.0400       2.5790  28.320
## 51        0.2106       0.06916    0.2563     1.1940       1.9330  22.690
## 52        0.1881       0.05907    0.2318     0.4966       2.2760  19.880
## 53        0.1847       0.06019    0.3438     1.1400       2.2250  25.060
## 54        0.1342       0.06129    0.3354     2.3240       2.1050  29.960
## 55        0.2200       0.06229    0.5539     1.5600       4.6670  83.160
## 56        0.1942       0.06902    0.2860     1.0160       1.5350  12.960
## 57        0.1499       0.06758    0.1924     0.6417       1.3450  13.040
## 58        0.1703       0.06048    0.4245     1.2680       2.6800  26.430
## 59        0.2655       0.06877    1.5090     3.1200       9.8070 233.000
## 60        0.1893       0.05892    0.4709     0.9951       2.9030  53.160
## 61        0.2310       0.06343    0.9811     1.6660       8.8300 104.900
## 62        0.1538       0.06365    1.0880     1.4100       7.3370 122.300
## 63        0.1308       0.05866    0.5296     1.6670       3.7670  58.530
## 64        0.1784       0.05587    0.2385     0.8265       1.5720  20.530
## 65        0.2521       0.07032    0.4388     0.7096       3.3840  44.910
## 66        0.1551       0.06761    0.2949     1.6560       1.9550  21.550
## 67        0.1496       0.05674    0.2927     0.8907       2.0440  24.680
## 68        0.1632       0.05255    0.3160     0.9115       1.9540  28.900
## 69        0.2110       0.05853    0.2479     0.9195       1.8300  19.410
## 70        0.1859       0.06461    0.2067     0.8745       1.3930  15.340
## 71        0.1720       0.06419    0.2130     0.5914       1.5450  18.520
## 72        0.1890       0.06331    0.2619     2.0150       1.7780  16.850
## 73        0.2330       0.08743    0.4653     1.9110       3.7690  24.200
## 74        0.1220       0.05243    0.4834     1.0460       3.1630  50.950
## 75        0.1844       0.05268    0.4789     2.0600       3.4790  46.610
## 76        0.1930       0.06404    0.2978     1.5020       2.2030  20.950
## 77        0.1621       0.05425    0.2577     0.4757       1.8170  28.920
## 78        0.1516       0.05667    0.2727     0.9429       1.8310  18.150
## 79        0.1601       0.06140    0.3265     0.6594       2.3460  25.180
```

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## 80         0.1992       0.06069    0.4537     0.8733       3.0610  49.810
## 81         0.1780       0.05650    0.2713     1.2170       1.8930  24.280
## 82         0.1667       0.05474    0.2382     0.8355       1.6870  18.320
## 83         0.1815       0.05696    0.2621     1.5390       2.0280  20.980
## 84         0.2116       0.06346    0.5115     0.7372       3.8140  42.760
## 85         0.2018       0.06914    0.2562     0.9858       1.8090  16.040
## 86         0.1337       0.05581    0.1532     0.4690       1.1150  12.680
## 87         0.1689       0.05808    0.1166     0.4957       0.7714   8.955
## 88         0.1375       0.06016    0.3408     1.9240       2.2870  28.930
## 89         0.1769       0.05278    0.6917     1.1270       4.3030  93.990
## 90         0.1714       0.06843    0.3191     1.2490       2.2840  26.450
## 91         0.1466       0.06133    0.2889     0.9899       1.7780  21.790
## 92         0.1526       0.06046    0.1532     0.7810       1.2530  11.910
## 93         0.1547       0.05443    0.2298     0.9988       1.5340  22.180
## 94         0.1667       0.05449    0.2621     1.2320       1.6570  21.190
## 95         0.2384       0.07542    0.2860     2.1100       2.1120  31.720
## 96         0.1782       0.05976    0.3371     0.7476       2.6290  33.270
## 97         0.1874       0.05899    0.2357     1.2990       2.3970  20.210
## 98         0.1875       0.05715    0.2070     1.2380       1.2340  13.880
## 99         0.1910       0.06908    0.2467     1.2170       1.6410  15.050
## 100        0.1829       0.06782    0.8973     1.4740       7.3820 120.000
## 101        0.1668       0.06862    0.3198     1.4890       2.2300  20.740
## 102        0.1653       0.06447    0.3539     4.8850       2.2300  21.690
## 103        0.1769       0.06270    0.1904     0.5293       1.1640  13.170
## 104        0.1586       0.05922    0.4727     1.2400       3.1950  45.400
## 105        0.1487       0.05635    0.1630     1.6010       0.8730  13.560
## 106        0.1779       0.06574    0.2034     1.1660       1.5670  14.340
## 107        0.1533       0.06184    0.3602     1.4780       3.2120  27.490
## 108        0.2124       0.06894    0.1811     0.7959       0.9857  12.580
## 109        0.1976       0.06328    0.5196     1.9180       3.5640  33.000
## 110        0.1615       0.06144    0.2865     1.6780       1.9680  18.990
## 111        0.1801       0.06520    0.3060     1.6570       2.1550  20.620
## 112        0.2222       0.08261    0.1935     1.9620       1.2430  10.210
## 113        0.1966       0.06213    0.7128     1.5810       4.8950  90.470
## 114        0.2069       0.07682    0.2121     1.1690       2.0610  19.210
## 115        0.1495       0.05888    0.4062     1.2100       2.6350  28.470
## 116        0.1467       0.05407    0.5100     1.6790       3.2830  58.380
## 117        0.1950       0.06466    0.2092     0.6509       1.4460  19.420
## 118        0.1929       0.06744    0.6470     1.3310       4.6750  66.910
## 119        0.2094       0.05581    0.9553     1.1860       6.4870 124.400
## 120        0.2035       0.06501    0.3106     1.5100       2.5900  21.570
## 121        0.1614       0.05890    0.2185     0.8561       1.4950  17.910
## 122        0.1765       0.05024    0.8601     1.4800       7.0290 111.700
## 123        0.1935       0.05878    0.2512     1.7860       1.9610  18.210
## 124        0.1717       0.05054    1.2070     1.0510       7.7330 224.100
## 125        0.1634       0.06372    0.1707     0.7615       1.0900  12.250
## 126        0.1411       0.06243    0.3278     1.0590       2.4750  22.930
## 127        0.1925       0.07692    0.3908     0.9238       2.4100  34.660
## 128        0.1627       0.05416    0.4157     1.6270       2.9140  33.010
## 129        0.1946       0.05044    0.6896     1.3420       5.2160  81.230
## 130        0.1926       0.05982    0.2027     1.8510       1.8950  18.540
## 131        0.2041       0.06898    0.2530     0.8749       3.4660  24.190
## 132        0.1848       0.06181    0.2244     0.8950       1.8040  19.360
## 133        0.1628       0.05781    0.2351     1.5970       1.5390  17.850
## 134        0.1726       0.05623    1.1760     1.2560       7.6730 158.700
## 135        0.1954       0.07976    0.1779     1.0300       1.3180  12.300
## 136        0.1995       0.06330    0.8068     0.9017       5.4550 102.600
## 137        0.1985       0.07098    0.5169     2.0790       3.1670  28.850
## 138        0.1590       0.05907    0.1822     0.7285       1.1710  13.250
## 139        0.1727       0.06071    0.8161     2.1290       6.0760  87.170
## 140        0.1868       0.06110    0.2273     0.6329       1.5200  17.470
## 141        0.1697       0.05699    0.8529     1.8490       5.6320  93.540
## 142        0.2419       0.07871    1.0950     0.9053       8.5890 153.400
## 143        0.1752       0.05533    0.7655     2.4630       5.2030  99.040
## 144        0.1949       0.07292    0.7036     1.2680       5.3730  60.780
## 145        0.2252       0.06924    0.2545     0.9832       2.1100  21.050
## 146        0.1718       0.05780    0.1859     1.9260       1.0110  14.470
## 147        0.1842       0.06082    0.5058     0.9849       3.5640  54.160
## 148        0.1495       0.05593    0.3389     1.4390       2.3440  33.580
## 149        0.1472       0.05561    0.3778     2.2000       2.4870  31.160
## 150        0.1602       0.06066    0.1199     0.8944       0.8484   9.227
## 151        0.1215       0.05673    0.1716     0.7151       1.0470  12.690
## 152        0.2538       0.07029    0.6965     1.7470       4.6070  43.520
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## 153        0.1778        0.06235    0.2143     0.7712       1.6890  16.640
## 154        0.1885        0.06201    0.2104     0.9670       1.3560  12.970
## 155        0.1714        0.07192    0.8811     1.7700       4.3600  77.110
## 156        0.1506        0.06959    0.5079     1.2470       3.2670  30.480
## 157        0.1573        0.05520    0.2580     1.1660       1.6830  22.220
## 158        0.1895        0.06870    0.2366     1.4280       1.8220  16.970
## 159        0.2372        0.05768    0.1818     2.5420       1.2770  13.120
## 160        0.1809        0.05718    0.2338     1.3530       1.7350  20.200
## 161        0.1386        0.05318    0.4057     1.1530       2.7010  36.350
## 162        0.2595        0.06233    0.4866     1.9050       2.8770  34.680
## 163        0.1424        0.05883    0.2543     1.3630       1.7370  20.740
## 164        0.1788        0.06833    0.1746     1.3050       1.1440   9.789
## 165        0.1505        0.05484    1.2910     0.7452       9.6350 180.200
## 166        0.1800        0.05770    0.8361     1.4810       5.8200 128.700
## 167        0.2075        0.05448    0.5220     0.8121       3.7630  48.290
## 168        0.2108        0.05464    0.8348     1.6330       6.1460  90.940
## 169        0.1822        0.06207    0.2710     0.7927       1.8190  22.790
## 170        0.1473        0.05580    0.2500     0.7574       1.5730  21.470
## 171        0.2128        0.06777    0.2871     0.8937       1.8970  24.250
## 172        0.1669        0.06544    0.2208     0.9533       1.6020  18.850
## 173        0.2196        0.07451    0.5835     1.3770       3.8560  50.960
## 174        0.1635        0.05859    0.3380     1.9160       2.5910  26.760
## 175        0.1598        0.05671    0.4697     1.1470       3.1420  43.400
## 176        0.1718        0.05997    0.2655     1.0950       1.7780  20.350
## 177        0.1917        0.05961    0.7275     1.1930       4.8370 102.500
## 178        0.1535        0.06214    0.1855     0.6881       1.2630  12.980
## 179        0.1907        0.06049    0.6289     0.6633       4.2930  71.560
## 180        0.1739        0.05677    0.1924     1.5710       1.1830  14.680
## 181        0.1979        0.06013    0.3534     1.3260       2.3080  27.240
## 182        0.1798        0.05391    0.7474     1.0160       5.0290  79.250
## 183        0.1592        0.05912    0.2191     0.6946       1.4790  17.740
## 184        0.1594        0.05986    0.2711     0.3621       1.9740  26.440
## 185        0.1940        0.06028    0.2976     1.9660       1.9590  19.620
## 186        0.1449        0.06031    0.1753     1.0270       1.2670  11.090
## 187        0.2131        0.06325    0.2959     0.6790       2.1530  31.980
## 188        0.1692        0.05727    0.5959     1.2020       3.7660  68.350
## 189        0.1928        0.05096    0.5925     0.6863       3.8680  74.850
## 190        0.2081        0.06312    0.2684     1.4090       1.7500  16.390
## 191        0.1861        0.06248    0.7049     1.3320       4.5330  74.080
## 192        0.1601        0.05541    0.2522     1.0450       1.6490  18.950
## 193        0.1687        0.05669    0.2446     0.4334       1.8260  23.310
## 194        0.2303        0.07077    0.3700     1.0330       2.8790  32.550
## 195        0.1618        0.05549    0.3699     1.1500       2.4060  40.980
## 196        0.1634        0.07224    0.5190     2.9100       5.8010  67.100
## 197        0.1647        0.06464    0.6534     1.5060       4.1740  63.370
## 198        0.1685        0.05866    0.3721     1.1110       2.2790  33.760
## 199        0.1723        0.06317    0.1998     0.6068       1.4430  16.070
## 200        0.1646        0.06154    0.2666     0.8309       2.0970  19.960
## 201        0.1565        0.05504    1.2140     2.1880       8.0770 106.000
## 202        0.2016        0.05977    0.3077     1.6210       2.2400  20.200
## 203        0.1944        0.05913    0.3186     1.3360       2.3100  28.510
## 204        0.1735        0.07070    0.3424     1.8030       2.7110  20.480
## 205        0.2009        0.06506    0.3446     0.7395       2.3550  24.530
## 206        0.1807        0.07083    0.3331     1.9610       2.9370  32.520
## 207        0.1516        0.05859    0.1816     0.7656       1.3030  12.890
## 208        0.1619        0.06287    0.6450     2.1050       4.1380  49.110
## 209        0.1365        0.05335    0.2244     0.6864       1.5090  20.390
## 210        0.2395        0.07398    0.6298     0.7629       4.4140  81.460
## 211        0.1432        0.05935    0.2913     1.3890       2.3470  23.290
## 212        0.2027        0.06758    0.4226     1.1500       2.7350  40.090
## 213        0.1927        0.06487    0.5907     1.0410       3.7050  69.470
## 214        0.1617        0.05594    0.1833     0.5308       1.5920  15.260
## 215        0.1861        0.06837    0.1482     0.5380       1.3010   9.597
## 216        0.2743        0.06960    0.5158     1.4410       3.3120  34.620
## 217        0.2120        0.06623    0.3834     1.0030       2.4950  28.620
## 218        0.1506        0.06009    0.3478     1.0180       2.7490  31.010
## 219        0.2087        0.07613    0.3345     0.8902       2.2170  27.190
## 220        0.1801        0.05553    0.6642     0.8561       4.6030  97.850
## 221        0.1638        0.06100    0.1807     0.6931       1.3400  13.380
## 222        0.1583        0.06275    0.2253     0.6457       1.5270  17.370
## 223        0.1792        0.06552    1.1110     1.1610       7.2370 133.000
## 224        0.1842        0.07005    0.3251     2.1740       2.0770  24.620
## 225        0.1928        0.05075    0.3300     1.9250       2.1550  21.980
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## 225       0.1928       0.05975    0.3309     1.9250       2.1550  21.980
## 226       0.2163       0.07359    0.3368     2.7770       2.2220  17.810
## 227       0.2057       0.09575    0.2744     1.3900       1.7870  17.670
## 228       0.1724       0.06053    0.4331     1.0010       3.0080  52.490
## 229       0.1506       0.05491    0.3971     0.8282       3.0880  40.730
## 230       0.1773       0.06081    0.2144     0.9961       1.5290  15.070
## 231       0.1799       0.06166    0.3135     2.4260       2.1500  23.130
## 232       0.1571       0.05708    0.3833     0.9078       2.6020  30.150
## 233       0.1704       0.07769    0.3628     1.4900       3.3990  29.250
## 234       0.1948       0.06277    0.4375     1.2320       3.2700  44.410
## 235       0.1539       0.05637    0.2409     1.3670       1.4770  18.760
## 236       0.1853       0.06401    0.3713     1.1540       2.5540  27.570
## 237       0.1737       0.06672    0.2796     0.9622       3.5910  25.200
## 238       0.1678       0.07126    0.1267     0.6793       1.0690   7.254
## 239       0.1897       0.06329    0.2497     1.4930       1.4970  16.640
## 240       0.1737       0.06440    0.3719     2.6120       2.5170  23.220
## 241       0.1908       0.06130    0.4250     0.8098       2.5630  35.740
## 242       0.1649       0.07633    0.1665     0.5864       1.3540   8.966
## 243       0.1274       0.06724    0.1186     1.1820       1.1740   6.802
## 244       0.1564       0.05307    0.4007     1.3170       2.5770  44.410
## 245       0.1733       0.06697    0.7661     0.7800       4.1150  92.810
## 246       0.1580       0.06235    0.2957     1.3630       2.0540  18.240
## 247       0.1630       0.06439    0.1851     1.3410       1.1840  11.600
## 248       0.1872       0.06341    0.2542     1.0790       2.6150  23.110
## 249       0.1769       0.06503    0.1563     0.9567       1.0940   8.205
## 250       0.1615       0.06104    0.1912     1.7050       1.5160  13.860
## 251       0.1668       0.06869    0.3720     0.8423       2.3040  34.840
## 252       0.2495       0.08104    1.2920     2.4540      10.1200 138.500
## 253       0.1810       0.07252    0.3305     1.0670       2.5690  22.970
## 254       0.2113       0.07115    0.4030     0.7747       3.1230  41.510
## 255       0.1976       0.06457    0.5461     2.6350       4.0910  44.740
## 256       0.2025       0.06601    0.4302     2.8780       2.7590  25.170
## 257       0.1473       0.05746    0.2535     1.3540       1.9940  23.040
## 258       0.1601       0.05913    0.1916     1.5550       1.3590  13.660
## 259       0.1590       0.05653    0.2368     0.8732       1.4710  18.330
## 260       0.1885       0.05766    0.2699     0.7886       2.0580  23.560
## 261       0.1937       0.06161    0.2841     1.6520       1.8690  22.220
## 262       0.1593       0.06127    0.2199     2.2390       1.4370  14.460
## 263       0.1931       0.05796    0.4743     0.7859       3.0940  48.310
## 264       0.1579       0.05594    0.3316     0.9264       2.0560  28.410
## 265       0.2248       0.06382    0.6009     1.3980       3.9990  67.780
## 266       0.2350       0.07389    0.3063     1.0020       2.4060  24.320
## 267       0.1964       0.06315    0.3567     1.9220       2.7470  22.790
## 268       0.1902       0.08980    0.5262     0.8522       3.1680  25.440
## 269       0.1544       0.05976    0.2239     1.1390       1.5770  18.040
## 270       0.1978       0.06000    0.5243     1.8020       4.0370  60.410
## 271       0.1574       0.05750    0.3639     1.2650       2.6680  30.570
## 272       0.2397       0.07800    0.9555     3.5680      11.0700 116.200
## 273       0.1641       0.05764    0.1504     1.6850       1.2370  12.670
## 274       0.1720       0.05914    0.2505     1.0250       1.7400  19.680
## 275       0.1767       0.05529    0.4357     1.0730       3.8330  54.220
## 276       0.1648       0.05525    2.8730     1.4760      21.9800 525.600
## 277       0.1487       0.05748    0.2323     1.6360       1.5960  21.840
## 278       0.1590       0.05648    0.4564     1.0750       3.4250  48.550
## 279       0.1661       0.05948    0.3163     1.3040       2.1150  20.670
## 280       0.1870       0.07285    0.3777     1.4620       2.4920  19.140
## 281       0.2152       0.06673    0.9806     0.5505       6.3110 134.800
## 282       0.1637       0.06343    0.1344     1.0830       0.9812   9.332
## 283       0.1555       0.06048    0.2430     1.1520       1.5590  18.020
## 284       0.1717       0.05660    0.3242     0.6612       1.9960  27.190
## 285       0.1867       0.05580    0.4203     0.7383       2.8190  45.420
## 286       0.1409       0.05355    0.2204     1.0060       1.4710  19.980
## 287       0.2235       0.06433    0.4207     1.8450       3.5340  31.000
## 288       0.1802       0.06188    0.5079     0.8737       3.6540  59.700
## 289       0.2205       0.05898    1.0040     0.8208       6.3720 137.900
## 290       0.1641       0.06854    0.2324     0.6332       1.6960  18.400
## 291       0.1742       0.06059    0.5375     2.9270       3.6180  29.110
## 292       0.1872       0.05669    0.1705     0.5066       1.3720  14.000
## 293       0.1834       0.06877    0.6191     2.1120       4.9060  49.700
## 294       0.1695       0.05916    0.2527     0.7786       1.8740  18.570
## 295       0.1824       0.06140    1.0080     0.6999       7.5610 130.200
## 296       0.1991       0.06739    0.9915     0.9004       7.0500 139.900
## 297       0.2127       0.06251    0.6986     0.9901       4.7060  87.780
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## 298        0.1582        0.05395    0.7582     1.0170       5.8650 112.400
## 299        0.1657        0.06608    0.2513     0.5040       1.7140  18.540
## 300        0.2151        0.06578    0.3147     0.9857       3.0700  33.120
## 301        0.1741        0.05176    1.0000     0.6336       6.9710 119.300
## 302        0.1635        0.05586    0.2300     0.6690       1.6610  20.560
## 303        0.1442        0.05743    0.2818     0.7614       1.8080  18.540
## 304        0.2116        0.07325    0.3906     0.9306       3.0930  33.670
## 305        0.1935        0.06303    0.3473     0.9209       2.2440  32.190
## 306        0.1448        0.05592    0.5240     1.1890       3.7670  70.010
## 307        0.2128        0.07152    0.2602     1.2050       2.3620  22.650
## 308        0.1735        0.06200    0.1458     0.9050       0.9975  11.360
## 309        0.1744        0.06493    0.4220     1.9090       3.2710  39.430
## 310        0.1962        0.06303    0.2569     0.4981       2.0110  21.030
## 311        0.2166        0.05419    0.8336     1.7360       5.1680 100.400
## 312        0.1813        0.05613    0.3093     0.8568       2.1930  33.630
## 313        0.1732        0.06088    0.2431     0.9462       1.5640  20.640
## 314        0.2015        0.05875    0.6412     2.2930       4.0210  48.840
## 315        0.1974        0.06782    0.3704     0.8249       2.4270  31.330
## 316        0.1421        0.05763    0.1689     1.1500       1.4000  14.910
## 317        0.1809        0.05883    0.7572     0.7813       5.4380  94.440
## 318        0.1909        0.06309    1.0580     0.9635       7.2470 155.800
## 319        0.2030        0.06552    0.2800     1.4670       1.9940  17.850
## 320        0.1521        0.05912    0.3428     0.3981       2.5370  29.060
## 321        0.2082        0.07325    0.3921     1.2070       5.0040  30.190
## 322        0.1896        0.05656    0.4615     0.9197       3.0080  45.190
## 323        0.2095        0.05649    0.7576     1.5090       4.5540  87.870
## 324        0.1688        0.06194    0.3118     0.9227       2.0000  24.790
## 325        0.1546        0.05754    0.1153     0.6745       0.7570   9.006
## 326        0.2132        0.06022    0.6997     1.4750       4.7820  80.600
## 327        0.1517        0.05835    0.2589     1.5030       1.6670  22.070
## 328        0.2096        0.07331    0.5520     1.0720       3.5980  58.630
## 329        0.2540        0.06087    0.4202     1.3220       2.8730  34.780
## 330        0.1797        0.05506    1.0090     0.9245       6.4620 164.100
## 331        0.1903        0.06422    0.1988     0.4960       1.2180  12.260
## 332        0.1861        0.06347    0.3665     0.7693       2.5970  26.500
## 333        0.1381        0.06400    0.1728     0.4064       1.1260  11.480
## 334        0.1673        0.05649    0.2113     0.5996       1.4380  15.820
## 335        0.1957        0.06216    1.2960     1.4520       8.4190 101.900
## 336        0.1359        0.05526    0.2134     0.3628       1.5250  20.000
## 337        0.1528        0.05185    0.3511     0.9527       2.3290  28.300
## 338        0.2111        0.08046    0.3274     1.1940       1.8850  17.670
## 339        0.1953        0.06083    0.6422     1.5300       4.3690  88.250
## 340        0.1784        0.06259    0.1630     0.3871       1.1430  13.870
## 341        0.1735        0.05875    0.2387     0.6372       1.7290  21.830
## 342        0.1953        0.05629    0.5495     0.6636       3.0550  57.650
## 343        0.1869        0.06532    0.5706     1.4570       2.9610  57.720
## 344        0.2054        0.07669    0.2428     1.6420       2.3690  16.390
## 345        0.2160        0.05891    0.4332     1.2650       2.8440  43.680
## 346        0.1584        0.07065    0.4030     1.4240       2.7470  22.870
## 347        0.1930        0.06621    0.5381     1.2000       4.2770  30.180
## 348        0.1645        0.06562    0.2843     1.9080       1.9370  21.380
## 349        0.1561        0.05915    0.3860     1.1980       2.6300  38.490
## 350        0.1820        0.06850    0.2623     1.2040       1.8650  19.390
## 351        0.1589        0.05586    0.2142     0.6549       1.6060  19.250
## 352        0.1739        0.06149    0.6003     0.8225       4.6550  61.100
## 353        0.1566        0.05708    0.2116     1.3600       1.5020  16.830
## 354        0.1487        0.06529    0.2344     0.9861       1.5970  16.410
## 355        0.1953        0.06654    0.3577     1.2810       2.4500  35.240
## 356        0.1717        0.06899    0.2351     2.0110       1.6600  14.200
## 357        0.1934        0.06285    0.2137     1.3420       1.5170  12.330
## 358        0.1533        0.06057    0.2222     0.8652       1.4440  17.120
## 359        0.1794        0.05742    0.4467     0.7732       3.1800  53.910
## 360        0.1692        0.06576    0.3013     1.8790       2.1210  17.860
## 361        0.1467        0.05177    0.6874     1.0410       5.1440  83.500
## 362        0.1847        0.05338    0.4033     1.0780       2.9030  36.580
## 363        0.1701        0.05960    0.4455     3.6470       2.8840  35.130
## 364        0.1800        0.06569    0.1911     0.5477       1.3480  11.880
## 365        0.1900        0.06635    0.3661     1.5110       2.4100  24.440
## 366        0.1818        0.06782    0.2784     1.7680       1.6280  20.860
## 367        0.1971        0.06166    0.8113     1.4000       5.5400  93.910
## 368        0.1621        0.05952    0.1781     1.6870       1.2430  11.280
## 369        0.1833        0.06100    0.1312     0.3602       1.1070   9.438
## 370        0.1776        0.05647    0.5959     0.6342       3.7970  71.000
```

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## 371        0.1943        0.06612    0.2577     1.0950       1.5660  18.490
## 372        0.2341        0.06963    0.4098     2.2650       2.6080  23.520
## 373        0.1539        0.05945    0.1840     1.5320       1.1990  13.240
## 374        0.1464        0.06284    0.2194     1.1900       1.6780  16.260
## 375        0.1799        0.05826    0.1692     0.6674       1.1160  13.320
## 376        0.1613        0.06013    0.3276     1.4860       2.1080  24.600
## 377        0.1840        0.05680    0.3031     1.3850       2.1770  27.410
## 378        0.1779        0.06588    0.2608     0.8730       2.1170  19.200
## 379        0.1954        0.05821    0.2375     1.2800       1.5650  17.090
## 380        0.1883        0.06168    0.2562     1.0380       1.6860  18.620
## 381        0.1555        0.05673    0.3419     1.6780       2.3310  29.630
## 382        0.1695        0.06556    0.2868     1.1430       2.2890  20.560
## 383        0.2075        0.05636    0.4204     2.2200       3.3010  38.870
## 384        0.1998        0.06515    0.3340     0.6857       2.1830  35.030
## 385        0.1927        0.06211    0.2430     1.0100       1.4910  18.190
## 386        0.1669        0.06714    0.1144     1.0230       0.9887   7.326
## 387        0.1721        0.06194    1.1670     1.3520       8.8670 156.800
## 388        0.1482        0.06600    0.1485     1.5630       1.0350  10.080
## 389        0.1609        0.05871    0.4565     1.2900       2.8610  43.140
## 390        0.1711        0.05657    0.2067     0.4706       1.1460  20.670
## 391        0.1713        0.05916    0.3897     1.0770       2.8730  43.950
## 392        0.1060        0.05502    0.3141     3.8960       2.0410  22.810
## 393        0.1353        0.05953    0.1872     0.9234       1.4490  14.550
## 394        0.1902        0.06220    0.6361     1.0010       4.3210  69.650
## 395        0.1631        0.06155    0.2047     0.4801       1.3730  17.250
## 396        0.1607        0.05474    0.2541     0.6218       1.7090  23.120
## 397        0.1886        0.06320    0.2456     0.7339       1.6670  15.890
## 398        0.1717        0.06097    0.3129     0.8413       2.0750  29.440
## 399        0.2082        0.05715    0.6226     2.2840       5.1730  67.660
## 400        0.1350        0.06890    0.3350     2.0430       2.1320  20.050
## 401        0.1387        0.06891    0.2498     1.2160       1.9760  15.240
## 402        0.1422        0.05823    0.1639     1.1400       1.2230  14.660
## 403        0.1853        0.06261    0.5558     0.6062       3.5280  68.170
## 404        0.1571        0.05478    0.6137     0.6575       4.1190  77.020
## 405        0.1601        0.06432    0.2810     0.8135       3.3690  23.810
## 406        0.1618        0.05557    0.5781     0.9168       4.2180  72.440
## 407        0.1990        0.06572    0.1745     0.4890       1.3490  14.910
## 408        0.1667        0.06113    0.1408     0.4607       1.1030  10.500
## 409        0.2157        0.06768    0.4266     0.9489       2.9890  41.180
## 410        0.1551        0.06403    0.2152     0.8301       1.2150  12.640
## 411        0.1596        0.06409    0.2025     0.4402       2.3930  16.350
## 412        0.1869        0.05628    0.1210     0.8927       1.0590   8.605
## 413        0.1399        0.05688    0.2525     1.2390       1.8060  17.740
## 414        0.1339        0.05945    0.4489     2.5080       3.2580  34.370
## 415        0.2101        0.06113    0.5619     1.2680       3.7170  37.830
## 416        0.1823        0.06115    0.5659     1.4080       3.6310  67.740
## 417        0.1734        0.05865    0.1759     0.9938       1.1430  12.670
## 418        0.1912        0.06412    0.3491     0.7706       2.6770  32.140
## 419        0.1875        0.06020    0.9761     1.8920       7.1280 103.600
## 420        0.2678        0.07371    0.3197     1.4260       2.2810  24.720
## 421        0.2548        0.09296    0.8245     2.6640       4.0730  49.850
## 422        0.1616        0.05684    0.3105     0.8339       2.0970  29.910
## 423        0.1830        0.06105    0.2251     0.7815       1.4290  15.480
## 424        0.2378        0.09502    0.4076     1.0930       3.0140  20.040
## 425        0.1167        0.06217    0.3344     1.1080       1.9020  22.770
## 426        0.1905        0.06590    0.4255     1.1780       2.9270  36.460
## 427        0.2459        0.06581    0.3610     1.0500       2.4550  26.650
## 428        0.1573        0.05703    0.3028     0.6683       1.6120  23.920
## 429        0.1791        0.06331    0.2441     2.0900       1.6480  16.800
## 430        0.2398        0.07596    0.6592     1.0590       4.0610  59.460
## 431        0.1761        0.06130    0.2310     1.0050       1.7520  19.830
## 432        0.1860        0.05941    0.5449     0.9225       3.2180  67.360
## 433        0.2079        0.05968    0.2271     1.2550       1.4410  16.160
## 434        0.1832        0.06697    0.7923     1.0450       4.8510  95.770
## 435        0.1489        0.06640    0.2574     1.3760       2.8060  18.150
## 436        0.1373        0.05700    0.2571     1.0810       1.5580  23.920
## 437        0.1550        0.04996    0.3283     0.8280       2.3630  36.740
## 438        0.1829        0.05667    0.1942     0.9086       1.4930  15.750
## 439        0.1683        0.07187    0.1559     0.5796       1.0460   8.322
## 440        0.1993        0.06453    0.5018     1.6930       3.9260  38.340
## 441        0.1761        0.06540    0.2684     0.5664       2.4650  20.650
## 442        0.1664        0.05801    0.3460     1.3360       2.0660  31.240
## 443        0.1855        0.06284    0.4768     0.9644       3.7060  47.140
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## 443        0.1855        0.06284    0.4768     0.9644        3.7060  47.140
## 444        0.1779        0.06639    0.1588     0.5733        1.1020  12.840
## 445        0.1809        0.05966    0.5366     0.8561        3.0020  49.000
## 446        0.1815        0.06905    0.2773     0.9768        1.9090  15.700
## 447        0.1773        0.05429    0.4347     1.0570        2.8290  39.930
## 448        0.1382        0.06070    0.2335     0.9097        1.4660  16.970
## 449        0.1967        0.06314    0.2963     1.5630        2.0870  21.460
## 450        0.1793        0.06281    0.9291     1.1520        6.0510 115.200
## 451        0.1788        0.06450    0.1913     0.9027        1.2080  11.860
## 452        0.1943        0.06937    0.4053     1.8090        2.6420  34.440
## 453        0.1989        0.05884    0.6107     2.8360        5.3830  70.100
## 454        0.1349        0.06612    0.2560     1.5540        1.9550  20.240
## 455        0.2019        0.06290    0.2747     1.2030        1.9300  19.530
## 456        0.1724        0.06081    0.2406     0.7394        2.1200  21.200
## 457        0.2403        0.06641    0.4101     1.0140        2.6520  32.650
## 458        0.1769        0.05674    1.1720     1.6170        7.7490 199.700
## 459        0.1722        0.06724    0.2204     0.7873        1.4350  11.360
## 460        0.1395        0.05234    0.1731     1.1420        1.1010  14.340
## 461        0.2061        0.05623    2.5470     1.3060       18.6500 542.200
## 462        0.1943        0.06132    0.8191     1.9310        4.4930 103.900
## 463        0.2003        0.06246    0.1642     1.0310        1.2810  11.680
## 464        0.1405        0.05848    0.3563     0.4833        2.2350  29.340
## 465        0.3040        0.07413    1.0460     0.9760        7.2760 111.400
## 466        0.1811        0.07102    0.1767     1.4600        2.2040  15.430
## 467        0.1632        0.05894    0.1903     0.5735        1.2040  15.500
## 468        0.1720        0.05780    0.2986     0.5906        1.9210  35.770
## 469        0.1743        0.07279    0.3677     1.4710        1.5970  22.680
## 470        0.1714        0.05898    0.3892     1.0460        2.6440  32.740
## 471        0.1694        0.06287    0.7311     1.7480        5.1180  53.650
## 472        0.1515        0.05266    0.1840     1.0650        1.2860  16.640
## 473        0.1467        0.05863    0.1839     2.3420        1.1700  14.160
## 474        0.1428        0.05313    0.7392     1.3210        4.7220 109.900
## 475        0.1854        0.05698    0.6061     2.6430        4.0990  44.960
## 476        0.1807        0.05664    0.4041     0.5503        2.5470  48.900
## 477        0.1203        0.06659    0.1194     1.4340        1.7780   9.549
## 478        0.1554        0.05661    0.6643     1.3610        4.5420  81.890
## 479        0.1879        0.05852    0.2877     0.9480        2.1710  24.870
## 480        0.2275        0.07237    0.4751     1.5280        2.9740  39.050
## 481        0.1856        0.06402    0.2929     0.8570        1.9280  24.190
## 482        0.1879        0.06390    0.2895     1.8510        2.3760  26.850
## 483        0.2183        0.06197    0.8307     1.4660        5.5740 105.000
## 484        0.1669        0.08116    0.4311     2.2610        3.1320  27.480
## 485        0.1671        0.05731    0.3534     0.6724        2.2250  26.030
## 486        0.2375        0.07603    0.5204     1.3240        3.4770  51.220
## 487        0.2238        0.06413    0.3776     1.3500        2.5690  22.730
## 488        0.2556        0.07039    1.2150     1.5450       10.0500 170.000
## 489        0.1713        0.05888    0.3237     1.4730        2.3260  26.070
## 490        0.2196        0.07950    0.2114     1.0270        1.7190  13.990
## 491        0.2116        0.06077    0.7548     1.2880        5.3530  89.740
## 492        0.2397        0.07016    0.7260     1.5950        5.7720  86.220
## 493        0.1966        0.07069    0.4209     0.6583        2.8050  44.640
## 494        0.1619        0.06408    0.1507     1.5830        1.1650  10.090
## 495        0.1828        0.06757    0.3582     2.0670        2.4930  18.390
## 496        0.1709        0.07253    0.4426     1.1690        3.1760  34.370
## 497        0.1945        0.06322    0.1803     1.2220        1.5280  11.770
## 498        0.1746        0.06177    0.1938     0.6123        1.3340  14.490
## 499        0.1893        0.06232    0.8426     1.1990        7.1580 106.400
## 500        0.2091        0.06650    0.2419     1.2780        1.9030  23.020
## 501        0.1846        0.05325    0.2473     0.5679        1.7750  22.950
## 502        0.1528        0.05697    0.3795     1.1870        2.4660  40.510
## 503        0.2164        0.07356    0.5692     1.0730        3.8540  54.180
## 504        0.2188        0.08450    0.1115     1.2310        2.3630   7.228
## 505        0.1957        0.07255    0.4101     1.7400        3.0270  27.850
## 506        0.1845        0.05828    0.2239     1.6470        1.4890  15.460
## 507        0.1508        0.05376    0.1302     0.7198        0.8439  10.770
## 508        0.1659        0.05348    0.2182     0.6232        1.6770  20.720
## 509        0.2149        0.06879    0.9622     1.0260        8.7580 118.800
## 510        0.2085        0.06864    1.3700     1.2130        9.4240 176.500
## 511        0.1967        0.06811    0.1852     0.7477        1.3830  14.670
## 512        0.1538        0.05510    0.4212     1.4330        2.7650  45.810
## 513        0.2301        0.07799    0.4825     1.0300        3.4750  41.000
## 514        0.1360        0.06344    0.2102     0.4336        1.3910  17.400
## 515        0.2175        0.06218    0.4312     1.0220        2.9720  45.500
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## 516        0.2123        0.07254    0.3061     1.0690       2.2570  25.130
## 517        0.1812        0.05667    0.5435     0.7339       3.3980  74.080
## 518        0.2069        0.05999    0.7456     0.7869       4.5850  94.030
## 519        0.2092        0.06310    0.8337     1.5930       4.8770  98.810
## 520        0.1850        0.07310    0.1931     0.9223       1.4910  15.090
## 521        0.1925        0.06915    0.3276     1.1270       2.5640  20.770
## 522        0.1925        0.06373    0.3961     1.0440       2.4970  30.290
## 523        0.1852        0.05294    0.4681     1.6270       3.0430  45.380
## 524        0.1587        0.05884    0.3857     1.4280       2.5480  19.150
## 525        0.1930        0.07818    0.2241     1.5080       1.5530   9.833
## 526        0.2010        0.05769    0.2345     1.2190       1.5460  18.240
## 527        0.1514        0.06019    0.2449     1.0660       1.4450  18.510
## 528        0.2129        0.05025    0.5506     1.2140       3.3570  54.040
## 529        0.2013        0.05955    0.2656     1.9740       1.9540  17.490
## 530        0.1680        0.06412    0.3416     1.3120       2.2750  20.980
## 531        0.1588        0.06766    0.2742     1.3900       3.1980  21.910
## 532        0.2037        0.07751    0.2196     1.4790       1.4450  11.730
## 533        0.1459        0.05544    0.2954     0.8836       2.1090  23.240
## 534        0.1794        0.06323    0.3037     1.2840       2.4820  31.590
## 535        0.2202        0.06113    0.4953     1.1990       2.7650  63.330
## 536        0.1705        0.05913    0.1499     0.4875       1.1950  11.640
## 537        0.1920        0.05907    0.3249     0.9591       2.1830  23.470
## 538        0.1936        0.06128    0.1601     1.4300       1.1090  11.280
## 539        0.1620        0.06688    0.2720     1.0470       2.0760  23.120
## 540        0.1620        0.06582    0.2315     0.5391       1.4750  15.750
## 541        0.2026        0.05223    0.5858     0.8554       4.1060  68.460
## 542        0.2197        0.07696    0.3538     1.1300       2.3880  19.630
## 543        0.1697        0.05855    0.2719     1.3500       1.7210  22.450
## 544        0.2569        0.06670    0.5702     1.0230       4.0120  69.060
## 545        0.2906        0.08142    0.9317     1.8850       8.6490 116.400
## 546        0.1730        0.06470    0.2094     0.7636       1.2310  17.670
## 547        0.1305        0.07163    0.3132     0.9789       3.2800  16.940
## 548        0.1759        0.06183    0.2213     1.2850       1.5350  17.260
## 549        0.1537        0.06171    0.3645     1.4920       2.8880  29.840
## 550        0.1675        0.06043    0.2636     0.7294       1.8480  19.870
## 551        0.1580        0.06114    0.4993     1.7980       2.5520  41.240
## 552        0.1690        0.06083    0.4222     0.8092       3.3300  28.840
## 553        0.2030        0.08243    0.2976     1.5990       2.0390  23.940
## 554        0.1598        0.06677    0.4384     1.9070       3.1490  30.660
## 555        0.1619        0.05584    0.2084     1.3500       1.3140  17.580
## 556        0.2162        0.06606    0.6242     0.9209       4.1580  80.990
## 557        0.1834        0.05934    0.3927     0.8429       2.6840  26.990
## 558        0.2086        0.07406    0.5462     1.5110       4.7950  49.450
## 559        0.1566        0.06669    0.2073     1.8050       1.3770  19.080
## 560        0.1893        0.05886    0.2204     0.6221       1.4820  19.750
## 561        0.1885        0.06125    0.2860     1.0190       2.6570  24.910
## 562        0.1638        0.06129    0.2575     0.8073       1.9590  19.010
## 563        0.1707        0.05433    0.2315     0.9112       1.7270  20.520
## 564        0.1543        0.06476    0.2212     1.0420       1.6140  16.570
## 565        0.1454        0.05549    0.2023     0.6850       1.2360  16.890
## 566        0.1633        0.07005    0.3380     2.5090       2.3940  19.330
## 567        0.1727        0.06317    0.2054     0.4956       1.3440  19.530
## 568        0.1650        0.06121    0.3060     0.7213       2.1430  25.700
## 569        0.1973        0.06183    0.3414     1.3090       2.4070  39.060
##     smoothness_se compactness_se concavity_se points_se symmetry_se
## 1        0.008045       0.011800    0.0168300  0.012410    0.019240
## 2        0.007470       0.035810    0.0335400  0.013650    0.035040
## 3        0.005158       0.009355    0.0105600  0.007483    0.017180
## 4        0.011270       0.034980    0.0218700  0.019650    0.015800
## 5        0.005012       0.014850    0.0155100  0.009155    0.016470
## 6        0.007278       0.020470    0.0444700  0.008799    0.018680
## 7        0.008200       0.029820    0.0573800  0.012670    0.014880
## 8        0.008824       0.031080    0.0311200  0.012910    0.019980
## 9        0.007595       0.022190    0.0288000  0.008614    0.027100
## 10       0.007416       0.018770    0.0275800  0.010100    0.023480
## 11       0.006666       0.027910    0.0406200  0.014790    0.011170
## 12       0.005518       0.015620    0.0199400  0.007924    0.017990
## 13       0.007295       0.031790    0.0461500  0.012540    0.015610
## 14       0.007491       0.008593    0.0006920  0.004167    0.021900
## 15       0.011900       0.019290    0.0490700  0.014990    0.016410
## 16       0.004242       0.046390    0.0657800  0.016060    0.016380
## 17       0.005217       0.015150    0.0167800  0.012680    0.016690
## 18       0.006809       0.009514    0.0132900  0.006474    0.020570
```

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## 19       0.007964       0.047320    0.0764900  0.019360    0.027360
## 20       0.006773       0.024560    0.0101800  0.008094    0.026620
## 21       0.006905       0.008704    0.0197800  0.011850    0.018970
## 22       0.012880       0.034950    0.0186500  0.017660    0.015600
## 23       0.009519       0.021340    0.0199000  0.011550    0.020790
## 24       0.009006       0.041850    0.0320400  0.022580    0.023530
## 25       0.011880       0.037470    0.0459100  0.015440    0.022870
## 26       0.004717       0.020650    0.0175900  0.009206    0.012200
## 27       0.005884       0.014910    0.0187200  0.009366    0.018840
## 28       0.005233       0.030570    0.0357600  0.010830    0.017680
## 29       0.005954       0.034710    0.0502800  0.008510    0.017500
## 30       0.004394       0.012500    0.0145100  0.005484    0.012910
## 31       0.004148       0.004711    0.0028310  0.004821    0.014220
## 32       0.007499       0.012020    0.0233200  0.008920    0.016470
## 33       0.006766       0.070250    0.0659100  0.023110    0.016730
## 34       0.005888       0.023100    0.0205900  0.010750    0.025780
## 35       0.004953       0.018120    0.0303500  0.008648    0.015390
## 36       0.005212       0.029840    0.0244300  0.008356    0.018180
## 37       0.004444       0.016520    0.0226900  0.013700    0.013860
## 38       0.010170       0.047410    0.0278900  0.011100    0.031270
## 39       0.006123       0.024700    0.0262600  0.016040    0.020910
## 40       0.004563       0.034810    0.0387200  0.012090    0.013880
## 41       0.005043       0.015780    0.0211700  0.008185    0.012820
## 42       0.004057       0.022770    0.0402900  0.013030    0.016860
## 43       0.009110       0.074580    0.0566100  0.018670    0.059630
## 44       0.005231       0.023050    0.0311300  0.007315    0.016390
## 45       0.003308       0.013150    0.0099040  0.004832    0.013160
## 46       0.005530       0.052960    0.0611000  0.014440    0.021400
## 47       0.005883       0.006263    0.0093980  0.006189    0.020090
## 48       0.006369       0.042430    0.0426600  0.015080    0.023350
## 49       0.005442       0.019570    0.0330400  0.013670    0.013150
## 50       0.006530       0.033690    0.0471200  0.014030    0.027400
## 51       0.005960       0.034380    0.0390900  0.014350    0.019390
## 52       0.004119       0.032070    0.0364400  0.011550    0.013910
## 53       0.005463       0.019640    0.0207900  0.005398    0.014770
## 54       0.006307       0.028450    0.0385000  0.010110    0.011850
## 55       0.009327       0.051210    0.0895800  0.024650    0.021750
## 56       0.006794       0.035750    0.0398000  0.013830    0.021340
## 57       0.006982       0.039160    0.0401700  0.015280    0.022600
## 58       0.014390       0.012000    0.0015970  0.002404    0.025380
## 59       0.023330       0.098060    0.1278000  0.018220    0.045470
## 60       0.005654       0.021990    0.0305900  0.014990    0.016230
## 61       0.006548       0.100600    0.0972300  0.026380    0.053330
## 62       0.006174       0.036340    0.0464400  0.015690    0.011450
## 63       0.031130       0.085550    0.1438000  0.039270    0.021750
## 64       0.003280       0.011020    0.0139000  0.006881    0.013800
## 65       0.006789       0.053280    0.0644600  0.022520    0.036720
## 66       0.011340       0.031750    0.0312500  0.011350    0.018790
## 67       0.006032       0.011040    0.0225900  0.009057    0.014820
## 68       0.005031       0.006021    0.0053250  0.006324    0.014940
## 69       0.004235       0.015410    0.0145700  0.010430    0.015280
## 70       0.005251       0.017270    0.0184000  0.005298    0.014490
## 71       0.005367       0.022390    0.0304900  0.012620    0.013770
## 72       0.007803       0.014490    0.0169000  0.008043    0.021000
## 73       0.009845       0.065900    0.1027000  0.025270    0.034910
## 74       0.004369       0.008274    0.0115300  0.007437    0.013020
## 75       0.003443       0.026610    0.0305600  0.011100    0.015200
## 76       0.007112       0.024930    0.0270300  0.012930    0.019580
## 77       0.002866       0.009181    0.0141200  0.006719    0.010690
## 78       0.009282       0.009216    0.0206300  0.008965    0.021830
## 79       0.006494       0.027680    0.0313700  0.010690    0.017310
## 80       0.007231       0.027720    0.0250900  0.014800    0.014140
## 81       0.005080       0.013700    0.0072760  0.009073    0.013500
## 82       0.005996       0.022120    0.0211700  0.006433    0.020250
## 83       0.005498       0.020450    0.0179500  0.006399    0.018290
## 84       0.005508       0.044120    0.0443600  0.016230    0.024270
## 85       0.006635       0.017770    0.0210100  0.011640    0.021080
## 86       0.004731       0.013450    0.0165200  0.005905    0.016190
## 87       0.003681       0.009169    0.0087320  0.005740    0.011290
## 88       0.005841       0.012460    0.0079360  0.009128    0.015640
## 89       0.004728       0.012590    0.0171500  0.010380    0.010830
## 90       0.006739       0.022510    0.0208600  0.013520    0.018700
## 91       0.008534       0.006364    0.0061800  0.007408    0.010650
```

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## 91       0.008534       0.006364    0.0061800  0.007408    0.010650
## 92       0.003796       0.013710    0.0134600  0.007096    0.015360
## 93       0.002826       0.009105    0.0131100  0.005174    0.010130
## 94       0.006054       0.008974    0.0056810  0.006336    0.012150
## 95       0.007970       0.135400    0.1166000  0.016660    0.051130
## 96       0.005839       0.032450    0.0371500  0.014590    0.014670
## 97       0.003629       0.037130    0.0345200  0.010650    0.026320
## 98       0.007595       0.015000    0.0141200  0.008578    0.017920
## 99       0.007899       0.014000    0.0085340  0.007624    0.026370
## 100      0.008166       0.056930    0.0573000  0.020300    0.010650
## 101      0.008902       0.047850    0.0733900  0.017450    0.027280
## 102      0.001713       0.006736    0.0000000  0.000000    0.037990
## 103      0.006472       0.011220    0.0128200  0.008849    0.016920
## 104      0.005718       0.011620    0.0199800  0.011090    0.014100
## 105      0.006261       0.015690    0.0307900  0.005383    0.019620
## 106      0.004957       0.021140    0.0415600  0.008038    0.018430
## 107      0.009853       0.042350    0.0627100  0.019660    0.026390
## 108      0.006272       0.021980    0.0396600  0.009894    0.013200
## 109      0.008263       0.018700    0.0127700  0.005917    0.024660
## 110      0.006908       0.009442    0.0069720  0.006159    0.026940
## 111      0.008540       0.023100    0.0294500  0.013980    0.015650
## 112      0.012430       0.054160    0.0775300  0.010220    0.023090
## 113      0.008102       0.021010    0.0334200  0.016010    0.020450
## 114      0.006429       0.059360    0.0550100  0.016280    0.019610
## 115      0.005857       0.009758    0.0116800  0.007445    0.024060
## 116      0.008109       0.043080    0.0494200  0.017420    0.015940
## 117      0.004044       0.015970    0.0200000  0.007303    0.015220
## 118      0.007269       0.029280    0.0497200  0.016390    0.018520
## 119      0.006804       0.031690    0.0344600  0.017120    0.018970
## 120      0.007807       0.039320    0.0511200  0.018760    0.028600
## 121      0.004599       0.009169    0.0091270  0.004814    0.012470
## 122      0.008124       0.036110    0.0548900  0.027650    0.031760
## 123      0.006122       0.023370    0.0159600  0.006998    0.031940
## 124      0.005568       0.011120    0.0209600  0.011970    0.012630
## 125      0.009191       0.008548    0.0094000  0.006315    0.017550
## 126      0.006652       0.026520    0.0222100  0.007807    0.018940
## 127      0.007162       0.029120    0.0547300  0.013880    0.015470
## 128      0.008312       0.017420    0.0338900  0.015760    0.017400
## 129      0.004428       0.027310    0.0404000  0.013610    0.020300
## 130      0.006113       0.025830    0.0464500  0.012760    0.014510
## 131      0.006965       0.062130    0.0792600  0.022340    0.014990
## 132      0.003980       0.028090    0.0366900  0.012740    0.015810
## 133      0.004973       0.013720    0.0149800  0.009117    0.017240
## 134      0.010300       0.028910    0.0519800  0.024540    0.011140
## 135      0.012620       0.023480    0.0180000  0.012850    0.022200
## 136      0.006048       0.018820    0.0274100  0.011300    0.014680
## 137      0.015820       0.019660    0.0000000  0.000000    0.018650
## 138      0.005528       0.009789    0.0083420  0.006273    0.014650
## 139      0.006455       0.017970    0.0450200  0.017440    0.018290
## 140      0.007210       0.008380    0.0131100  0.008000    0.019960
## 141      0.010750       0.027220    0.0508100  0.019110    0.022930
## 142      0.006399       0.049040    0.0537300  0.015870    0.030030
## 143      0.005769       0.024230    0.0395000  0.016780    0.018980
## 144      0.009407       0.070560    0.0689900  0.018480    0.017000
## 145      0.004452       0.030550    0.0268100  0.013520    0.014540
## 146      0.007831       0.008776    0.0155600  0.006240    0.031390
## 147      0.005771       0.040610    0.0279100  0.012820    0.020080
## 148      0.007257       0.018050    0.0183200  0.010330    0.016940
## 149      0.007357       0.010790    0.0099590  0.011200    0.034330
## 150      0.003457       0.010470    0.0116700  0.005558    0.012510
## 151      0.004928       0.003012    0.0026200  0.003390    0.013930
## 152      0.013070       0.018850    0.0060210  0.010520    0.031000
## 153      0.005324       0.015630    0.0151000  0.007584    0.021040
## 154      0.007086       0.007247    0.0101200  0.005495    0.015600
## 155      0.007762       0.106400    0.0996000  0.027710    0.040770
## 156      0.006836       0.008982    0.0234800  0.006565    0.019420
## 157      0.003741       0.005274    0.0106500  0.005044    0.013440
## 158      0.008064       0.017640    0.0259500  0.010370    0.013570
## 159      0.010720       0.013310    0.0199300  0.011110    0.017170
## 160      0.004455       0.013820    0.0209500  0.011840    0.016410
## 161      0.004481       0.010380    0.0135800  0.010820    0.010690
## 162      0.015740       0.082620    0.0809900  0.034870    0.034180
## 163      0.005638       0.007939    0.0052540  0.006042    0.015440
```

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## 164      0.007389       0.004883    0.0036810  0.003472    0.027010
## 165      0.005753       0.033560    0.0397600  0.021560    0.022010
## 166      0.004631       0.025370    0.0310900  0.012410    0.015750
## 167      0.007089       0.014280    0.0236000  0.012860    0.022660
## 168      0.006717       0.059810    0.0463800  0.021490    0.027470
## 169      0.008584       0.020170    0.0304700  0.009536    0.027690
## 170      0.002838       0.015920    0.0178000  0.005828    0.013290
## 171      0.006532       0.023360    0.0290500  0.012150    0.017430
## 172      0.005314       0.017910    0.0218500  0.009567    0.012230
## 173      0.008805       0.030290    0.0248800  0.014480    0.014860
## 174      0.005436       0.024060    0.0309900  0.009919    0.020300
## 175      0.006003       0.010630    0.0215100  0.009443    0.015200
## 176      0.005293       0.016610    0.0207100  0.008179    0.017480
## 177      0.006458       0.023060    0.0294500  0.015380    0.018520
## 178      0.004259       0.014690    0.0194000  0.004168    0.011910
## 179      0.006294       0.039940    0.0555400  0.016950    0.024280
## 180      0.005080       0.006098    0.0106900  0.006797    0.014470
## 181      0.007514       0.017790    0.0140100  0.011400    0.015030
## 182      0.010820       0.022030    0.0350000  0.018090    0.015500
## 183      0.004348       0.008153    0.0042720  0.006829    0.021540
## 184      0.005472       0.019190    0.0203900  0.008260    0.015230
## 185      0.012890       0.011040    0.0032970  0.004967    0.042430
## 186      0.003478       0.012210    0.0107200  0.009393    0.029410
## 187      0.005532       0.020080    0.0305500  0.013840    0.011770
## 188      0.006001       0.014220    0.0285500  0.009148    0.014920
## 189      0.004536       0.013760    0.0264500  0.012470    0.021930
## 190      0.013800       0.010670    0.0083470  0.009472    0.017980
## 191      0.006770       0.019380    0.0306700  0.011670    0.018750
## 192      0.006175       0.012040    0.0137600  0.005832    0.010960
## 193      0.003271       0.017700    0.0231000  0.008399    0.011480
## 194      0.005607       0.042400    0.0474100  0.010900    0.018570
## 195      0.004626       0.022630    0.0195400  0.009767    0.015470
## 196      0.007545       0.060500    0.0213400  0.018430    0.030560
## 197      0.010520       0.024310    0.0491200  0.017460    0.021200
## 198      0.004868       0.018180    0.0112100  0.008606    0.020850
## 199      0.004413       0.014430    0.0150900  0.007369    0.013540
## 200      0.004405       0.030260    0.0434400  0.010870    0.019210
## 201      0.006883       0.010940    0.0181800  0.019170    0.007882
## 202      0.006543       0.021480    0.0299100  0.010450    0.018440
## 203      0.004449       0.028080    0.0331200  0.011960    0.019060
## 204      0.012910       0.040420    0.0510100  0.022950    0.021440
## 205      0.009536       0.010970    0.0165100  0.011210    0.019530
## 206      0.009538       0.049400    0.0601900  0.020410    0.021050
## 207      0.006709       0.017010    0.0208000  0.007497    0.021240
## 208      0.005596       0.010050    0.0127200  0.014320    0.015750
## 209      0.003338       0.003746    0.0020300  0.003242    0.014800
## 210      0.004253       0.047590    0.0387200  0.015670    0.017980
## 211      0.006418       0.039610    0.0792700  0.017740    0.018780
## 212      0.003659       0.028550    0.0257200  0.012720    0.018170
## 213      0.005820       0.056160    0.0425200  0.011270    0.015270
## 214      0.004271       0.020730    0.0282800  0.008468    0.014610
## 215      0.004474       0.030930    0.0275700  0.006691    0.012120
## 216      0.007514       0.010990    0.0076650  0.008193    0.041830
## 217      0.007509       0.015610    0.0197700  0.009199    0.018050
## 218      0.004107       0.032880    0.0282100  0.013500    0.016100
## 219      0.007510       0.033450    0.0367200  0.011370    0.021650
## 220      0.004910       0.025440    0.0282200  0.016230    0.019560
## 221      0.006064       0.011800    0.0065640  0.007978    0.013740
## 222      0.006131       0.012630    0.0090750  0.008231    0.017130
## 223      0.006056       0.032030    0.0563800  0.017330    0.018840
## 224      0.010370       0.017060    0.0258600  0.007506    0.018160
## 225      0.008713       0.010170    0.0000000  0.000000    0.032650
## 226      0.020750       0.014030    0.0000000  0.000000    0.061460
## 227      0.021770       0.048880    0.0518900  0.014500    0.026320
## 228      0.009087       0.027150    0.0554600  0.019100    0.024510
## 229      0.006090       0.025690    0.0271300  0.013450    0.015940
## 230      0.005617       0.007124    0.0009737  0.002941    0.017000
## 231      0.009861       0.024180    0.0427500  0.009215    0.024750
## 232      0.007702       0.008491    0.0130700  0.010300    0.029700
## 233      0.005298       0.074460    0.1435000  0.022920    0.025660
## 234      0.006697       0.020830    0.0324800  0.013920    0.015360
## 235      0.008835       0.012330    0.0132800  0.009305    0.018970
## 236      0.008998       0.012920    0.0185100  0.011670    0.021520
```

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## 237      0.008081       0.051220    0.0555100  0.018830    0.025450
## 238      0.007897       0.017620    0.0180100  0.007320    0.015920
## 239      0.007189       0.010350    0.0108100  0.006245    0.021580
## 240      0.016040       0.013860    0.0186500  0.011330    0.034760
## 241      0.006351       0.026790    0.0311900  0.013420    0.020620
## 242      0.008261       0.022130    0.0325900  0.010400    0.017080
## 243      0.005515       0.026740    0.0373500  0.005128    0.019510
## 244      0.005726       0.011060    0.0124600  0.007671    0.014110
## 245      0.008482       0.050570    0.0680000  0.019710    0.014670
## 246      0.007440       0.011230    0.0233700  0.009615    0.022030
## 247      0.005724       0.005697    0.0020740  0.003527    0.014450
## 248      0.007138       0.046530    0.0382900  0.011620    0.020680
## 249      0.008968       0.016460    0.0158800  0.005917    0.025740
## 250      0.007334       0.025890    0.0294100  0.009166    0.017450
## 251      0.004123       0.018190    0.0199600  0.010040    0.010550
## 252      0.012360       0.059950    0.0823200  0.030240    0.023370
## 253      0.010380       0.066690    0.0947200  0.020470    0.012190
## 254      0.007159       0.037180    0.0616500  0.010510    0.015910
## 255      0.010040       0.032470    0.0476300  0.028530    0.017150
## 256      0.014740       0.016740    0.0136700  0.008674    0.030440
## 257      0.004147       0.020480    0.0337900  0.008848    0.013940
## 258      0.005391       0.009947    0.0116300  0.005872    0.013410
## 259      0.007962       0.005612    0.0158500  0.008662    0.022540
## 260      0.008462       0.014600    0.0238700  0.013150    0.019800
## 261      0.008146       0.016310    0.0184300  0.007513    0.020150
## 262      0.012050       0.027360    0.0480400  0.017210    0.018430
## 263      0.006240       0.014840    0.0281300  0.010930    0.013970
## 264      0.003704       0.010820    0.0153000  0.006275    0.010620
## 265      0.008268       0.030820    0.0504200  0.011120    0.021020
## 266      0.005731       0.035020    0.0355300  0.012260    0.021430
## 267      0.004680       0.031200    0.0577400  0.010710    0.025600
## 268      0.017210       0.093680    0.0567100  0.017660    0.025410
## 269      0.005096       0.012050    0.0094100  0.004551    0.016080
## 270      0.010610       0.032520    0.0391500  0.015590    0.021860
## 271      0.005421       0.034770    0.0454500  0.013840    0.018690
## 272      0.003139       0.082970    0.0889000  0.040900    0.044840
## 273      0.005371       0.012730    0.0113200  0.009155    0.017190
## 274      0.004854       0.018190    0.0182600  0.007965    0.013860
## 275      0.005524       0.036980    0.0270600  0.012210    0.014150
## 276      0.013450       0.027720    0.0638900  0.014070    0.047830
## 277      0.005415       0.013710    0.0215300  0.011830    0.019590
## 278      0.005903       0.037310    0.0473000  0.015570    0.013180
## 279      0.009579       0.011040    0.0000000  0.000000    0.030040
## 280      0.012660       0.009692    0.0000000  0.000000    0.028820
## 281      0.007940       0.058390    0.0465800  0.020700    0.025910
## 282      0.004200       0.005900    0.0038460  0.004065    0.014870
## 283      0.007180       0.010960    0.0058320  0.005495    0.019820
## 284      0.006470       0.012480    0.0181000  0.011030    0.018980
## 285      0.004493       0.012060    0.0204800  0.009875    0.011440
## 286      0.003535       0.013930    0.0180000  0.006144    0.012540
## 287      0.010880       0.037100    0.0368800  0.016270    0.044990
## 288      0.005089       0.023030    0.0305200  0.011780    0.010570
## 289      0.005283       0.039080    0.0951800  0.018640    0.024010
## 290      0.005704       0.025020    0.0263600  0.010320    0.017590
## 291      0.011590       0.011240    0.0000000  0.000000    0.030040
## 292      0.004230       0.015870    0.0116900  0.006335    0.019430
## 293      0.013800       0.033480    0.0466500  0.020600    0.026890
## 294      0.005833       0.013880    0.0200000  0.007087    0.019380
## 295      0.003978       0.028210    0.0357600  0.014710    0.015180
## 296      0.004989       0.032120    0.0357100  0.015970    0.018790
## 297      0.004578       0.026160    0.0400500  0.014210    0.019480
## 298      0.006494       0.018930    0.0339100  0.015210    0.013560
## 299      0.007327       0.011530    0.0179800  0.007986    0.019620
## 300      0.009197       0.054700    0.0807900  0.022150    0.027730
## 301      0.009406       0.030550    0.0434400  0.027940    0.031560
## 302      0.003169       0.013770    0.0107900  0.005243    0.011030
## 303      0.006142       0.006134    0.0018350  0.003576    0.016370
## 304      0.005414       0.022650    0.0345200  0.013340    0.017050
## 305      0.004766       0.023740    0.0238400  0.008637    0.017720
## 306      0.005020       0.020620    0.0345700  0.010910    0.012980
## 307      0.004625       0.048440    0.0735900  0.016080    0.021370
## 308      0.002887       0.012850    0.0161300  0.007308    0.018700
## 309      0.005700       0.048770    0.0530300  0.015270    0.033560
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## 309      0.005790       0.048770    0.0530300  0.015270    0.033560
## 310      0.005851       0.023140    0.0254400  0.008360    0.018420
## 311      0.004938       0.030890    0.0409300  0.016990    0.028160
## 312      0.004757       0.015030    0.0233200  0.012620    0.013940
## 313      0.003245       0.008186    0.0169800  0.009233    0.012850
## 314      0.014180       0.014890    0.0126700  0.019100    0.026780
## 315      0.005072       0.021470    0.0218500  0.009560    0.017190
## 316      0.004942       0.012030    0.0075080  0.005179    0.014420
## 317      0.011490       0.024610    0.0568800  0.018850    0.017560
## 318      0.006428       0.028630    0.0449700  0.017160    0.015900
## 319      0.003495       0.030510    0.0344500  0.010240    0.029120
## 320      0.004732       0.015060    0.0185500  0.010670    0.021630
## 321      0.007234       0.074710    0.1114000  0.027210    0.032320
## 322      0.005776       0.024990    0.0369500  0.011950    0.027890
## 323      0.006016       0.034820    0.0423200  0.012690    0.026570
## 324      0.007803       0.025070    0.0183500  0.007711    0.012780
## 325      0.003265       0.004930    0.0064930  0.003762    0.017200
## 326      0.006471       0.016490    0.0280600  0.014200    0.023700
## 327      0.007389       0.013830    0.0073020  0.010040    0.012630
## 328      0.008699       0.039760    0.0595000  0.013900    0.014950
## 329      0.007017       0.011420    0.0194900  0.011530    0.029510
## 330      0.006292       0.019710    0.0358200  0.013010    0.014790
## 331      0.006040       0.005656    0.0000000  0.000000    0.022770
## 332      0.005910       0.013620    0.0070660  0.006502    0.022230
## 333      0.007809       0.009816    0.0109900  0.005344    0.012540
## 334      0.005343       0.005767    0.0112300  0.005051    0.019770
## 335      0.010000       0.034800    0.0657700  0.028010    0.051680
## 336      0.004291       0.012360    0.0184100  0.007373    0.009539
## 337      0.005783       0.004693    0.0007929  0.003617    0.020430
## 338      0.009549       0.086060    0.3038000  0.033220    0.041970
## 339      0.007548       0.038970    0.0391400  0.018160    0.021680
## 340      0.006034       0.018200    0.0333600  0.010670    0.011750
## 341      0.003958       0.012460    0.0183100  0.008747    0.015000
## 342      0.003872       0.018420    0.0371000  0.012000    0.019640
## 343      0.010560       0.037560    0.0583900  0.011860    0.040220
## 344      0.006663       0.059140    0.0888000  0.013140    0.019950
## 345      0.004877       0.019520    0.0221900  0.009231    0.015350
## 346      0.013850       0.029320    0.0272200  0.010230    0.032810
## 347      0.010930       0.028990    0.0321400  0.015060    0.028370
## 348      0.006664       0.017350    0.0115800  0.009520    0.022820
## 349      0.004952       0.016300    0.0296700  0.009423    0.011520
## 350      0.008320       0.020250    0.0233400  0.016650    0.020940
## 351      0.004837       0.009238    0.0092130  0.010760    0.011710
## 352      0.005627       0.030330    0.0340700  0.013540    0.019250
## 353      0.008412       0.021530    0.0389800  0.007620    0.016950
## 354      0.009113       0.015570    0.0244300  0.006435    0.015680
## 355      0.006703       0.023100    0.0231500  0.011840    0.019000
## 356      0.010520       0.017550    0.0171400  0.009333    0.022790
## 357      0.009719       0.012490    0.0079750  0.007527    0.022100
## 358      0.005517       0.017270    0.0204500  0.006747    0.016160
## 359      0.004314       0.013820    0.0225400  0.010390    0.013690
## 360      0.010940       0.018340    0.0399600  0.012820    0.037590
## 361      0.007959       0.031330    0.0425700  0.016710    0.013410
## 362      0.009769       0.031260    0.0505100  0.019920    0.029810
## 363      0.007339       0.008243    0.0000000  0.000000    0.031410
## 364      0.005682       0.013650    0.0084960  0.006929    0.019380
## 365      0.005433       0.011790    0.0113100  0.015190    0.022200
## 366      0.012150       0.041120    0.0555300  0.014940    0.018400
## 367      0.009037       0.049540    0.0520600  0.018410    0.017780
## 368      0.006588       0.012700    0.0145000  0.006104    0.015740
## 369      0.004124       0.013400    0.0100300  0.004667    0.020320
## 370      0.004649       0.018000    0.0274900  0.012670    0.013650
## 371      0.009702       0.015670    0.0257500  0.011610    0.028010
## 372      0.008738       0.039380    0.0431200  0.015600    0.041920
## 373      0.007881       0.008432    0.0070040  0.006522    0.019390
## 374      0.004911       0.016660    0.0139700  0.005161    0.014540
## 375      0.003888       0.008539    0.0125600  0.006888    0.016080
## 376      0.010390       0.010030    0.0064160  0.007895    0.028690
## 377      0.004775       0.011720    0.0194700  0.012690    0.018700
## 378      0.006715       0.037050    0.0475700  0.010510    0.018380
## 379      0.008426       0.008998    0.0014870  0.003333    0.023580
## 380      0.006662       0.012280    0.0210500  0.010060    0.016770
## 381      0.005836       0.010950    0.0058120  0.007039    0.020140
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## 382      0.010170       0.014430    0.0186100  0.012500    0.034640
## 383      0.009369       0.029830    0.0537100  0.017610    0.024180
## 384      0.004185       0.028680    0.0266400  0.009067    0.017030
## 385      0.008577       0.016410    0.0209900  0.011070    0.024340
## 386      0.010270       0.030840    0.0261300  0.010970    0.022770
## 387      0.005687       0.049600    0.0632900  0.015610    0.019240
## 388      0.008875       0.009362    0.0180800  0.009199    0.017910
## 389      0.005872       0.014880    0.0264700  0.009921    0.014650
## 390      0.007394       0.012030    0.0247000  0.014310    0.013440
## 391      0.004714       0.020150    0.0369700  0.011100    0.012370
## 392      0.007594       0.008878    0.0000000  0.000000    0.019890
## 393      0.004477       0.011770    0.0107900  0.007956    0.013250
## 394      0.007392       0.024490    0.0398800  0.012930    0.014350
## 395      0.003828       0.007228    0.0070780  0.005077    0.010540
## 396      0.003728       0.014150    0.0198800  0.007016    0.016470
## 397      0.005884       0.020050    0.0263100  0.013040    0.018480
## 398      0.009882       0.024440    0.0453100  0.017630    0.024710
## 399      0.004756       0.033680    0.0434500  0.018060    0.037560
## 400      0.011130       0.014630    0.0053080  0.005250    0.018010
## 401      0.008732       0.020420    0.0106200  0.006801    0.018240
## 402      0.005919       0.032700    0.0495700  0.010380    0.012080
## 403      0.005015       0.033180    0.0349700  0.009643    0.015430
## 404      0.006211       0.018950    0.0268100  0.012320    0.012760
## 405      0.004929       0.066570    0.0768300  0.013680    0.015260
## 406      0.006208       0.019060    0.0237500  0.014610    0.014450
## 407      0.004510       0.018120    0.0195100  0.011960    0.019340
## 408      0.006040       0.015290    0.0151400  0.006460    0.013440
## 409      0.006985       0.025630    0.0301100  0.012710    0.016020
## 410      0.011640       0.010400    0.0118600  0.009623    0.023830
## 411      0.005501       0.055920    0.0815800  0.013700    0.012660
## 412      0.003653       0.016470    0.0163300  0.003125    0.015370
## 413      0.006547       0.017810    0.0201800  0.005612    0.016710
## 414      0.006578       0.013800    0.0266200  0.013070    0.013590
## 415      0.008034       0.014420    0.0151400  0.018460    0.029210
## 416      0.005288       0.028330    0.0425600  0.011760    0.017170
## 417      0.005133       0.015210    0.0143400  0.008602    0.015010
## 418      0.004577       0.030530    0.0384000  0.012430    0.018730
## 419      0.008439       0.046740    0.0590400  0.025360    0.037100
## 420      0.005427       0.036330    0.0464900  0.018430    0.056280
## 421      0.010970       0.095860    0.3960000  0.052790    0.035460
## 422      0.004675       0.010300    0.0160300  0.009222    0.010950
## 423      0.009019       0.008985    0.0119600  0.008232    0.023880
## 424      0.009783       0.045420    0.0348300  0.021880    0.025420
## 425      0.007356       0.037280    0.0591500  0.017120    0.021650
## 426      0.007781       0.026480    0.0297300  0.012900    0.016350
## 427      0.005800       0.024170    0.0078160  0.010520    0.027340
## 428      0.005756       0.016650    0.0146100  0.008281    0.015510
## 429      0.012910       0.022220    0.0041740  0.007082    0.025720
## 430      0.010150       0.045880    0.0498300  0.021270    0.018840
## 431      0.004088       0.011740    0.0179600  0.006880    0.013230
## 432      0.006176       0.018770    0.0291300  0.010460    0.015590
## 433      0.005969       0.018120    0.0200700  0.007027    0.019720
## 434      0.007974       0.032140    0.0443500  0.015730    0.016170
## 435      0.008565       0.046380    0.0643000  0.017680    0.015160
## 436      0.006692       0.011320    0.0057170  0.006627    0.014160
## 437      0.007571       0.011140    0.0262300  0.014630    0.019300
## 438      0.005298       0.015870    0.0232100  0.008420    0.018530
## 439      0.010110       0.010550    0.0198100  0.005742    0.020900
## 440      0.009433       0.024050    0.0416700  0.011520    0.033970
## 441      0.005727       0.032550    0.0439300  0.009811    0.027510
## 442      0.005868       0.020990    0.0202100  0.009064    0.020870
## 443      0.009250       0.037150    0.0486700  0.018510    0.014980
## 444      0.004450       0.014520    0.0133400  0.008791    0.016980
## 445      0.004860       0.027850    0.0260200  0.013740    0.012260
## 446      0.009606       0.014320    0.0198500  0.014210    0.020270
## 447      0.004351       0.026670    0.0337100  0.010070    0.025980
## 448      0.004729       0.006887    0.0011840  0.003951    0.014660
## 449      0.008872       0.041920    0.0594600  0.017850    0.027930
## 450      0.008740       0.022190    0.0272100  0.014580    0.020450
## 451      0.006513       0.008061    0.0028170  0.004972    0.015020
## 452      0.009098       0.038450    0.0376300  0.013210    0.018780
## 453      0.011240       0.040970    0.0746900  0.034410    0.027680
## 454      0.006854       0.060630    0.0666300  0.015530    0.023540
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## 455      0.009895       0.030530    0.0163000  0.009276    0.022580
## 456      0.005706       0.022970    0.0311400  0.014930    0.014540
## 457      0.013400       0.028390    0.0116200  0.008239    0.025720
## 458      0.004551       0.014780    0.0214300  0.009280    0.013670
## 459      0.009172       0.008007    0.0000000  0.000000    0.027110
## 460      0.003418       0.002252    0.0015950  0.001852    0.016130
## 461      0.007650       0.053740    0.0805500  0.025980    0.016970
## 462      0.008074       0.040880    0.0532100  0.018340    0.023830
## 463      0.005296       0.019030    0.0172300  0.006960    0.018800
## 464      0.006432       0.011560    0.0077410  0.005657    0.012270
## 465      0.008029       0.037990    0.0373200  0.023970    0.023080
## 466      0.010000       0.032950    0.0486100  0.011670    0.021870
## 467      0.003632       0.007861    0.0011280  0.002386    0.013440
## 468      0.004117       0.015600    0.0297500  0.009753    0.012950
## 469      0.010490       0.042650    0.0400400  0.015440    0.027190
## 470      0.007976       0.012950    0.0160800  0.009046    0.020050
## 471      0.004571       0.017900    0.0217600  0.017570    0.033730
## 472      0.003634       0.007983    0.0082680  0.006432    0.019240
## 473      0.004352       0.004899    0.0134300  0.011640    0.026710
## 474      0.005539       0.026440    0.0266400  0.010780    0.013320
## 475      0.007517       0.015550    0.0146500  0.011830    0.020470
## 476      0.004821       0.016590    0.0240800  0.011430    0.012750
## 477      0.005042       0.045600    0.0430500  0.016670    0.024700
## 478      0.005467       0.020750    0.0318500  0.014660    0.010290
## 479      0.005332       0.021150    0.0153600  0.011870    0.015220
## 480      0.009680       0.038560    0.0347600  0.016160    0.024340
## 481      0.003818       0.012760    0.0288200  0.012000    0.019100
## 482      0.008005       0.028950    0.0332100  0.014240    0.014620
## 483      0.006248       0.033740    0.0519600  0.011580    0.020070
## 484      0.012860       0.088080    0.1197000  0.024600    0.038800
## 485      0.006583       0.006991    0.0059490  0.006296    0.022160
## 486      0.009329       0.065590    0.0995300  0.022830    0.055430
## 487      0.007501       0.019890    0.0271400  0.009883    0.019600
## 488      0.006515       0.086680    0.1040000  0.024800    0.031120
## 489      0.007802       0.020520    0.0134100  0.005564    0.020860
## 490      0.007405       0.045490    0.0458800  0.013390    0.017380
## 491      0.007997       0.027000    0.0373700  0.016480    0.028970
## 492      0.006522       0.061580    0.0711700  0.016640    0.023240
## 493      0.005393       0.023210    0.0430300  0.013200    0.017920
## 494      0.009501       0.033780    0.0440100  0.013460    0.013220
## 495      0.011930       0.031620    0.0300000  0.009259    0.033570
## 496      0.005273       0.023290    0.0140500  0.012440    0.018160
## 497      0.009058       0.021960    0.0302900  0.011120    0.016090
## 498      0.003350       0.013840    0.0145200  0.006853    0.011130
## 499      0.006356       0.047650    0.0386300  0.015190    0.019360
## 500      0.005345       0.025560    0.0288900  0.010220    0.009947
## 501      0.002667       0.014460    0.0142300  0.005297    0.019610
## 502      0.004029       0.009269    0.0110100  0.007591    0.014600
## 503      0.007026       0.025010    0.0318800  0.012970    0.016890
## 504      0.008499       0.076430    0.1535000  0.029190    0.016170
## 505      0.014590       0.032060    0.0496100  0.018410    0.018070
## 506      0.004359       0.006813    0.0032230  0.003419    0.019160
## 507      0.003492       0.003710    0.0048260  0.003608    0.015360
## 508      0.006708       0.011970    0.0148200  0.010560    0.015800
## 509      0.006399       0.043100    0.0784500  0.026240    0.020570
## 510      0.008198       0.038890    0.0449300  0.021390    0.020180
## 511      0.004097       0.018980    0.0169800  0.006490    0.016780
## 512      0.005444       0.011690    0.0162200  0.008522    0.014190
## 513      0.005551       0.034140    0.0420500  0.010440    0.022730
## 514      0.004133       0.016950    0.0165200  0.006659    0.013710
## 515      0.005635       0.039170    0.0607200  0.016560    0.031970
## 516      0.006983       0.038580    0.0468300  0.014990    0.016800
## 517      0.005225       0.013080    0.0186000  0.013400    0.013890
## 518      0.006150       0.040060    0.0383200  0.020580    0.022500
## 519      0.003899       0.029610    0.0281700  0.009222    0.026740
## 520      0.005251       0.030410    0.0252600  0.008304    0.025140
## 521      0.007364       0.038670    0.0526300  0.012640    0.021610
## 522      0.006953       0.019110    0.0270100  0.010370    0.017820
## 523      0.006831       0.014270    0.0248900  0.009087    0.031510
## 524      0.007189       0.004660    0.0000000  0.000000    0.026760
## 525      0.010190       0.010840    0.0000000  0.000000    0.026590
## 526      0.005518       0.021780    0.0258900  0.006330    0.025930
## 527      0.005169       0.022040    0.0301600  0.008691    0.013650
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## 527      0.005169       0.022940    0.0301600  0.008691    0.013650
## 528      0.004024       0.008422    0.0229100  0.009863    0.050140
## 529      0.006538       0.013950    0.0137600  0.009924    0.034160
## 530      0.010980       0.012570    0.0103100  0.003934    0.026930
## 531      0.006719       0.051560    0.0438700  0.016330    0.018720
## 532      0.015470       0.064570    0.0925200  0.013640    0.021050
## 533      0.007337       0.011740    0.0053830  0.005623    0.019400
## 534      0.006627       0.040940    0.0537100  0.018130    0.016820
## 535      0.005033       0.031790    0.0475500  0.010430    0.015780
## 536      0.004873       0.017960    0.0331800  0.008360    0.016010
## 537      0.008328       0.008722    0.0134900  0.008670    0.032180
## 538      0.006064       0.009110    0.0104200  0.007638    0.023490
## 539      0.006298       0.021720    0.0261500  0.009061    0.014900
## 540      0.006153       0.013300    0.0169300  0.006884    0.016510
## 541      0.005038       0.015030    0.0194600  0.011230    0.022940
## 542      0.015460       0.025400    0.0219700  0.015800    0.039970
## 543      0.006383       0.008008    0.0018600  0.002924    0.025710
## 544      0.005485       0.024310    0.0319000  0.013690    0.027680
## 545      0.010380       0.068350    0.1091000  0.025930    0.078950
## 546      0.008725       0.020030    0.0233500  0.011320    0.026250
## 547      0.018350       0.067600    0.0926300  0.023080    0.023840
## 548      0.005608       0.016460    0.0152900  0.009997    0.019090
## 549      0.007256       0.026780    0.0207100  0.016260    0.020800
## 550      0.005488       0.014270    0.0232200  0.005660    0.014280
## 551      0.006011       0.044800    0.0517500  0.013410    0.026690
## 552      0.005541       0.033870    0.0450500  0.014710    0.031020
## 553      0.007149       0.072170    0.0774300  0.014320    0.017890
## 554      0.006587       0.018150    0.0173700  0.013160    0.018350
## 555      0.005768       0.008082    0.0151000  0.006451    0.013470
## 556      0.005215       0.037260    0.0471800  0.012880    0.020450
## 557      0.006380       0.010650    0.0124500  0.009175    0.022920
## 558      0.009976       0.052440    0.0527800  0.015800    0.026530
## 559      0.014960       0.021210    0.0145300  0.015830    0.030820
## 560      0.004796       0.011710    0.0175800  0.006897    0.022540
## 561      0.005878       0.029950    0.0481500  0.011610    0.020280
## 562      0.005403       0.014180    0.0105100  0.005142    0.013330
## 563      0.005356       0.016790    0.0197100  0.006370    0.014140
## 564      0.005910       0.020160    0.0190200  0.010110    0.012020
## 565      0.005969       0.014930    0.0156400  0.008463    0.010930
## 566      0.017360       0.046710    0.0261100  0.012960    0.036750
## 567      0.003290       0.013950    0.0177400  0.006009    0.011720
## 568      0.006133       0.012510    0.0161500  0.011360    0.022070
## 569      0.004426       0.026750    0.0343700  0.013430    0.016750
##      dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1       0.0022480       13.500         15.64           86.97      549.1
## 2       0.0033180       11.880         22.94           78.28      424.8
## 3       0.0021980       12.410         26.44           79.93      471.4
## 4       0.0034420       11.920         15.77           76.53      434.0
## 5       0.0017670       16.200         15.73          104.50      819.1
## 6       0.0033390       13.070         26.98           86.43      520.5
## 7       0.0047380       12.480         37.16           82.28      474.2
## 8       0.0045060       19.200         41.85          128.50     1153.0
## 9       0.0034510       11.540         23.31           74.22      402.8
## 10      0.0029170       11.920         19.90           79.76      440.0
## 11      0.0037270       23.860         30.76          163.20     1760.0
## 12      0.0024840       13.590         25.22           86.60      564.2
## 13      0.0032300       14.800         25.46          100.90      689.1
## 14      0.0029900       14.230         22.25           90.24      624.1
## 15      0.0018070       21.440         30.96          139.80     1421.0
## 16      0.0044060       15.480         27.27          105.90      733.5
## 17      0.0023300       17.500         19.25          114.30      922.8
## 18      0.0017840       13.710         21.10           88.70      574.4
## 19      0.0059280       23.680         29.43          158.80     1696.0
## 20      0.0041430       13.340         17.81           91.38      545.2
## 21      0.0016710       13.010         21.39           84.42      521.5
## 22      0.0058240       12.980         32.19           86.12      487.7
## 23      0.0027010       12.400         25.58           82.76      472.4
## 24      0.0049840       16.110         18.33          105.90      762.6
## 25      0.0067920       11.160         22.75           72.62      374.4
## 26      0.0031300       16.570         20.86          110.30      812.4
## 27      0.0018170       15.100         25.94           97.59      699.4
## 28      0.0029670       20.270         36.71          149.30     1269.0
## 29      0.0040310       10.750         23.07           71.25      353.6
```

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## 30     0.0020740       14.730         21.70          93.76      663.5
## 31     0.0022730       14.730         17.40          93.96      672.4
## 32     0.0026290       14.490         33.37          92.04      653.6
## 33     0.0113000       21.570         28.87         143.60     1437.0
## 34     0.0022670       14.100         28.88          89.00      610.2
## 35     0.0022810       16.760         17.24         108.50      862.0
## 36     0.0048680       14.540         19.64          97.96      657.0
## 37     0.0016980       24.860         26.58         165.90     1866.0
## 38     0.0094230       13.150         16.51          86.26      509.6
## 39     0.0034930       20.050         26.30         130.70     1260.0
## 40     0.0040810       18.550         25.09         126.90     1031.0
## 41     0.0018920       24.330         39.16         162.30     1844.0
## 42     0.0033180       26.730         26.39         174.90     2232.0
## 43     0.0092080       14.910         26.50          98.87      567.7
## 44     0.0057010       13.720         16.91          87.38      576.0
## 45     0.0020950       15.140         21.80         101.20      718.9
## 46     0.0050360       19.760         24.70         129.10     1228.0
## 47     0.0023770       11.680         20.29          74.35      421.1
## 48     0.0033850       33.130         23.58         229.30     3234.0
## 49     0.0024640       14.800         27.20          97.33      675.2
## 50     0.0046510       13.460         23.07          88.13      551.3
## 51     0.0045600       15.750         26.93         104.40      750.1
## 52     0.0032040       16.410         19.31         114.20      808.2
## 53     0.0030710       13.450         24.49          86.00      562.0
## 54     0.0035890       15.750         40.54         102.50      764.0
## 55     0.0051950       25.120         32.68         177.00     1986.0
## 56     0.0046030       15.530         23.19          96.66      614.9
## 57     0.0068220       12.450         17.60          81.25      473.8
## 58     0.0034700       11.870         21.18          75.39      437.0
## 59     0.0098750       26.020         23.99         180.90     2073.0
## 60     0.0019650       23.790         28.65         152.40     1628.0
## 61     0.0076460       24.090         33.17         177.40     1651.0
## 62     0.0051200       23.140         32.33         155.30     1660.0
## 63     0.0125600       18.070         28.07         120.40     1021.0
## 64     0.0012860       15.930         30.25         102.50      787.9
## 65     0.0043940       18.070         19.08         125.10      980.9
## 66     0.0053480       13.580         28.68          87.36      553.0
## 67     0.0024960       15.140         23.60          98.84      708.8
## 68     0.0008948       16.460         21.75         103.70      840.8
## 69     0.0015930       14.980         21.74          98.37      670.0
## 70     0.0026710       13.350         28.81          87.00      550.6
## 71     0.0031870       15.530         26.02         107.30      740.4
## 72     0.0027780       11.160         26.84          71.98      384.0
## 73     0.0078770       10.060         23.40          68.62      297.1
## 74     0.0013090       19.820         18.42         127.10     1210.0
## 75     0.0015190       18.220         28.07         120.30     1032.0
## 76     0.0044630       13.830         30.50          91.46      574.7
## 77     0.0010870       21.310         26.36         139.20     1410.0
## 78     0.0021460       12.330         23.84          78.00      466.7
## 79     0.0043920       14.190         16.40          92.04      618.8
## 80     0.0033360       21.080         25.41         138.10     1349.0
## 81     0.0017060       16.110         23.00         104.60      793.7
## 82     0.0017250       13.350         19.59          86.65      546.7
## 83     0.0019560       14.200         29.20          92.94      621.2
## 84     0.0048410       16.340         18.24         109.40      803.6
## 85     0.0037210       12.840         20.53          84.93      476.1
## 86     0.0020810       13.620         15.54          87.40      577.0
## 87     0.0013660       13.610         19.27          87.22      564.9
## 88     0.0029850       15.050         41.61          96.69      705.6
## 89     0.0019870       29.170         35.59         188.00     2615.0
## 90     0.0037470       15.110         25.63          99.43      701.9
## 91     0.0033510       13.630         16.15          86.70      570.7
## 92     0.0015410       14.060         24.34          92.82      607.3
## 93     0.0013450       17.910         31.67         115.90      988.6
## 94     0.0015140       14.340         31.88          91.06      628.5
## 95     0.0117200       15.740         37.18         106.40      762.4
## 96     0.0031210       18.760         21.98         124.30     1070.0
## 97     0.0037050       14.130         24.61          96.31      621.9
## 98     0.0017840       13.060         25.75          84.35      517.8
## 99     0.0037610       11.170         22.84          71.94      375.6
## 100    0.0058930       30.000         33.62         211.70     2562.0
## 101    0.0076100       11.690         25.21          76.51      410.4
## 102    0.0016880        9.968         20.83          62.25      303.8
```

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## 103    0.0028170       12.320         16.18          78.27      457.5
## 104    0.0020850       19.070         30.88         123.40     1138.0
## 105    0.0022500       13.940         27.82          88.28      602.0
## 106    0.0036140       12.400         21.90          82.04      467.6
## 107    0.0042050       13.370         22.43          89.02      547.4
## 108    0.0038130       13.160         24.17          85.13      515.3
## 109    0.0029770       13.030         31.45          83.90      505.6
## 110    0.0020600       12.360         28.92          79.26      458.0
## 111    0.0038400       13.140         29.26          85.51      521.7
## 112    0.0117800        9.092         29.72          58.08      249.8
## 113    0.0045700       22.250         24.90         145.40     1549.0
## 114    0.0080930       15.030         32.01         108.80      697.7
## 115    0.0017690       12.980         25.72          82.98      516.5
## 116    0.0037390       20.380         35.46         132.80     1284.0
## 117    0.0019760       18.330         30.12         117.90     1044.0
## 118    0.0042320       21.200         29.41         142.10     1359.0
## 119    0.0040450       25.730         28.64         170.30     2009.0
## 120    0.0057150       14.190         24.85          94.22      591.2
## 121    0.0017080       15.490         23.58         100.30      725.9
## 122    0.0023650       23.240         27.84         158.30     1656.0
## 123    0.0022110       12.440         31.62          81.39      476.5
## 124    0.0018030       30.750         26.44         199.50     3143.0
## 125    0.0030090       12.510         20.79          79.67      475.8
## 126    0.0034110       12.680         21.61          82.69      489.8
## 127    0.0070980       16.310         22.40         106.40      827.2
## 128    0.0028710       15.790         31.71         102.20      758.2
## 129    0.0026860       22.320         25.73         148.20     1538.0
## 130    0.0037560       15.290         34.27         104.30      728.3
## 131    0.0057840       16.350         27.57         125.40      832.7
## 132    0.0039560       15.140         25.50         101.40      708.8
## 133    0.0013430       14.370         37.17          92.48      629.6
## 134    0.0042390       25.450         26.40         166.10     2027.0
## 135    0.0083130       11.690         20.74          76.08      411.1
## 136    0.0028010       26.460         31.56         177.00     2215.0
## 137    0.0067360       10.170         22.80          64.01      317.0
## 138    0.0025300       13.140         18.41          84.08      532.8
## 139    0.0037330       20.990         33.15         143.20     1362.0
## 140    0.0026350       13.100         21.33          83.67      527.2
## 141    0.0042170       21.310         27.26         139.90     1403.0
## 142    0.0061930       25.380         17.33         184.60     2019.0
## 143    0.0024980       23.690         38.25         155.00     1731.0
## 144    0.0061130       17.670         29.51         119.10      959.5
## 145    0.0037110       17.620         33.21         122.40      896.9
## 146    0.0019880       12.570         26.48          79.57      489.5
## 147    0.0041440       20.420         27.28         136.50     1299.0
## 148    0.0020010       18.130         25.45         117.20     1009.0
## 149    0.0029610       12.900         20.21          81.76      515.9
## 150    0.0013560       13.290         27.49          85.56      544.1
## 151    0.0013440       13.340         19.71          84.48      544.2
## 152    0.0042250       11.210         23.17          71.79      380.9
## 153    0.0018870       14.480         21.82          97.17      643.8
## 154    0.0026060       11.250         21.77          71.12      384.9
## 155    0.0228600       15.770         22.13         101.70      767.3
## 156    0.0027130       12.020         25.02          75.79      439.6
## 157    0.0011260       15.500         26.10          98.91      739.1
## 158    0.0030400       12.840         35.34          87.22      514.0
## 159    0.0044920       10.940         23.31          69.35      366.3
## 160    0.0019560       15.150         31.82          99.00      698.8
## 161    0.0014350       16.360         22.35         104.50      830.6
## 162    0.0065170       11.860         22.33          78.27      437.6
## 163    0.0020870       15.110         25.58          96.74      694.4
## 164    0.0021530        9.699         20.07          60.90      285.5
## 165    0.0028970       30.790         23.87         211.50     2782.0
## 166    0.0027470       33.120         32.85         220.80     3216.0
## 167    0.0014630       16.770         16.90         110.40      873.2
## 168    0.0058380       20.390         27.24         137.90     1295.0
## 169    0.0034790       14.770         20.50          97.67      677.3
## 170    0.0019760       15.340         22.46          97.19      725.9
## 171    0.0036430       15.670         27.95         102.80      759.4
## 172    0.0028460       17.040         30.80         113.90      869.3
## 173    0.0054120       17.060         28.14         110.60      897.0
## 174    0.0030090       14.800         30.04          97.66      661.5
## 175    0.0018680       17.080         29.87         116.60      903.6
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## 175    0.0018680       17.980          29.87          116.60      993.6
## 176    0.0028480       14.240          24.82           91.88      622.1
## 177    0.0026080       26.140          28.14          170.10     2145.0
## 178    0.0035370       12.680          20.35           80.79      496.7
## 179    0.0035350       22.820          21.32          150.60     1567.0
## 180    0.0015320       13.340          32.84           84.58      547.8
## 181    0.0033380       14.440          28.36           92.15      638.4
## 182    0.0019480       19.770          24.56          128.80     1223.0
## 183    0.0018020       14.670          16.93           94.17      661.1
## 184    0.0028810       17.770          20.24          117.70      989.5
## 185    0.0019630       11.980          25.78           76.91      436.1
## 186    0.0034280       11.370          14.82           72.42      392.2
## 187    0.0023360       19.590          24.89          133.50     1189.0
## 188    0.0022050       22.520          31.39          145.60     1590.0
## 189    0.0015890       23.060          23.03          150.20     1657.0
## 190    0.0042610       10.750          20.88           68.09      355.2
## 191    0.0034340       19.920          25.27          129.00     1233.0
## 192    0.0018570       13.800          20.14           87.64      589.5
## 193    0.0023790       17.180          18.22          112.00      906.6
## 194    0.0054660       17.460          37.13          124.10      943.2
## 195    0.0024300       20.110          32.82          129.30     1269.0
## 196    0.0103900       20.330          32.72          141.30     1298.0
## 197    0.0048670       18.510          33.22          121.20     1050.0
## 198    0.0028930       16.110          29.11          102.90      803.7
## 199    0.0017870       15.350          25.16          101.90      719.8
## 200    0.0046220       13.130          19.29           87.65      529.9
## 201    0.0017540       14.990          25.20           95.54      698.8
## 202    0.0026900       12.760          32.04           83.69      489.5
## 203    0.0040150       16.760          31.55          110.20      867.1
## 204    0.0058910       13.330          25.47           89.00      527.4
## 205    0.0031000       13.060          18.16           84.16      516.4
## 206    0.0060000       17.110          36.33          117.70      909.4
## 207    0.0027680       12.770          24.02           82.68      495.1
## 208    0.0027580       13.360          23.39           85.10      553.6
## 209    0.0015660       14.970          16.94           95.48      698.7
## 210    0.0052950       26.680          33.48          176.50     2089.0
## 211    0.0036960       13.900          19.69           92.12      595.6
## 212    0.0041080       17.870          30.70          115.70      985.5
## 213    0.0062990       23.320          33.82          151.60     1681.0
## 214    0.0026130       14.240          17.37           96.59      623.7
## 215    0.0046720       11.940          19.35           80.78      433.1
## 216    0.0059530       11.020          17.45           69.86      368.6
## 217    0.0036290       14.450          21.74           93.63      624.1
## 218    0.0027440       16.450          27.26          112.10      828.5
## 219    0.0050820       15.470          23.75          103.40      741.6
## 220    0.0037400       28.010          28.22          184.20     2403.0
## 221    0.0013920       13.500          17.48           88.54      553.7
## 222    0.0044140       13.650          16.92           88.12      566.9
## 223    0.0047870       25.930          26.24          171.10     2053.0
## 224    0.0039760       13.110          32.16           84.53      525.1
## 225    0.0010020       11.540          19.20           73.20      408.3
## 226    0.0068200        8.952          22.44           56.65      240.1
## 227    0.0114800       10.600          18.04           69.47      328.1
## 228    0.0040050       22.030          25.07          146.00     1479.0
## 229    0.0026580       20.420          25.84          139.50     1239.0
## 230    0.0020300       12.760          22.06           82.08      492.7
## 231    0.0021280       13.120          38.81           86.04      527.8
## 232    0.0014320       13.180          16.85           84.11      533.1
## 233    0.0129800       15.300          23.73          107.00      709.0
## 234    0.0027890       19.280          30.38          129.80     1121.0
## 235    0.0017260       13.870          36.00           88.10      594.7
## 236    0.0032130       13.320          21.59           86.57      549.8
## 237    0.0043120       16.080          27.78          118.60      784.7
## 238    0.0039250        9.473          18.45           63.30      275.6
## 239    0.0026190       12.250          35.19           77.98      455.7
## 240    0.0035600       11.480          29.46           73.68      402.8
## 241    0.0026950       16.390          22.07          108.10      826.0
## 242    0.0038060        9.628          19.62           64.48      284.4
## 243    0.0045830        9.965          27.99           66.61      301.0
## 244    0.0015780       19.850          31.47          128.20     1218.0
## 245    0.0072590       25.280          25.59          159.80     1933.0
## 246    0.0041540       10.930          25.59           69.10      364.2
## 247    0.0024110       11.110          28.94           69.92      376.3
```

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## 248    0.0061110       16.220         31.73          113.50      808.9
## 249    0.0025820        8.964         21.96           57.26      242.2
## 250    0.0043020       13.090         37.88           85.07      523.7
## 251    0.0032370       16.760         20.43          109.70      856.9
## 252    0.0060420       19.850         31.64          143.70     1226.0
## 253    0.0123300       12.040         18.93           79.73      450.0
## 254    0.0050990       20.800         27.78          149.60     1304.0
## 255    0.0055280       14.620         15.38           94.52      653.3
## 256    0.0045900       10.850         31.24           68.73      359.4
## 257    0.0023270       16.300         28.39          108.10      830.5
## 258    0.0016590       13.050         36.32           85.07      521.3
## 259    0.0019060       13.460         19.76           85.67      554.9
## 260    0.0023000       15.110         19.26           99.70      711.2
## 261    0.0017980       13.560         25.80           88.33      559.5
## 262    0.0049380       10.840         34.91           69.57      357.6
## 263    0.0024610       19.260         26.00          124.90     1156.0
## 264    0.0022170       16.410         26.42          104.40      830.5
## 265    0.0038540       20.880         32.09          136.10     1344.0
## 266    0.0037490       15.490         30.73          106.20      739.3
## 267    0.0046130       11.480         24.47           75.40      403.7
## 268    0.0219300        9.733         15.67           62.56      284.4
## 269    0.0023990       14.170         31.99           92.74      622.9
## 270    0.0039490       21.650         30.53          144.90     1417.0
## 271    0.0040670       13.740         21.06           90.72      591.0
## 272    0.0128400       20.960         29.94          151.70     1332.0
## 273    0.0014440       14.920         25.34           96.42      684.5
## 274    0.0023040       14.110         23.21           89.71      611.1
## 275    0.0033970       23.360         32.06          166.40     1688.0
## 276    0.0044760       28.110         18.47          188.50     2499.0
## 277    0.0018120       16.010         28.48          103.90      783.6
## 278    0.0038920       18.980         34.12          126.70     1124.0
## 279    0.0022280       11.660         24.77           74.08      412.3
## 280    0.0068720        9.077         30.92           57.17      248.0
## 281    0.0070540       22.390         18.91          150.10     1610.0
## 282    0.0022950       11.930         26.43           76.38      435.9
## 283    0.0027540       13.640         27.06           86.54      562.6
## 284    0.0017940       14.850         19.05           94.11      683.4
## 285    0.0015750       21.580         29.33          140.50     1436.0
## 286    0.0012190       16.460         25.44          106.00      831.0
## 287    0.0047680       16.860         34.85          115.00      811.3
## 288    0.0033910       23.730         25.23          160.50     1646.0
## 289    0.0050020       25.580         27.00          165.30     2010.0
## 290    0.0035630       14.380         22.15           95.29      633.7
## 291    0.0033240       10.490         34.24           66.50      330.6
## 292    0.0021770       14.840         20.21           99.16      670.6
## 293    0.0043060       16.390         34.01          111.60      806.9
## 294    0.0019600       14.290         24.04           93.85      624.6
## 295    0.0037960       27.660         25.80          195.00     2227.0
## 296    0.0047600       29.920         26.93          205.70     2642.0
## 297    0.0026890       24.300         25.48          160.20     1809.0
## 298    0.0019970       27.320         30.88          186.80     2398.0
## 299    0.0022340       13.450         15.77           86.92      549.9
## 300    0.0063550       17.390         23.05          122.10      939.7
## 301    0.0033620       22.030         17.81          146.60     1495.0
## 302    0.0019570       16.220         25.26          105.80      819.7
## 303    0.0026650       12.360         18.20           78.07      470.0
## 304    0.0040050       16.410         29.66          113.30      844.4
## 305    0.0031310       19.560         30.29          125.90     1088.0
## 306    0.0028870       24.470         37.38          162.70     1872.0
## 307    0.0061420       17.520         42.79          128.70      915.0
## 308    0.0019720       13.860         23.02           89.69      580.9
## 309    0.0093680       16.250         25.47          107.10      809.7
## 310    0.0029180       14.980         17.13          101.10      686.6
## 311    0.0027190       23.230         27.15          152.00     1645.0
## 312    0.0023620       19.850         25.09          130.90     1222.0
## 313    0.0015240       14.960         23.53           95.78      686.5
## 314    0.0030020       12.400         18.99           79.46      472.4
## 315    0.0033170       17.380         28.00          113.10      907.2
## 316    0.0016840       14.690         35.63           97.11      680.6
## 317    0.0051150       22.540         16.67          152.20     1575.0
## 318    0.0030530       31.010         34.51          206.00     2944.0
## 319    0.0047230       12.020         28.26           77.80      436.6
## 320    0.0027830       17.270         17.93          114.20      880.8
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## 321    0.0096270       13.780          21.03           97.82      580.6
## 322    0.0026650       20.010          29.02          133.50     1229.0
## 323    0.0044110       24.220          31.59          156.10     1750.0
## 324    0.0038560       13.670          26.15           87.54      583.0
## 325    0.0013600       13.200          20.37           83.85      543.4
## 326    0.0037550       22.930          27.68          152.20     1603.0
## 327    0.0029250       15.330          30.28           98.27      715.5
## 328    0.0059840       20.190          30.50          130.30     1272.0
## 329    0.0015330       14.160          24.11           90.82      616.7
## 330    0.0031180       30.670          30.73          202.40     2906.0
## 331    0.0032200       10.620          14.10           66.53      342.9
## 332    0.0023780       14.450          24.38           95.14      626.9
## 333    0.0021200       11.600          12.02           73.66      414.0
## 334    0.0009502       12.850          16.47           81.60      513.1
## 335    0.0028870       18.550          21.43          121.40      971.4
## 336    0.0016560       17.380          15.92          113.70      932.7
## 337    0.0010580       13.720          20.98           86.82      585.7
## 338    0.0095590       10.310          22.65           65.50      324.7
## 339    0.0044450       24.540          34.37          161.10     1873.0
## 340    0.0022560       17.010          14.20          112.50      854.3
## 341    0.0016210       17.710          19.58          115.90      947.9
## 342    0.0033370       24.560          30.41          152.90     1623.0
## 343    0.0061870       17.730          25.21          113.70      975.2
## 344    0.0086750       12.580          27.96           87.16      472.9
## 345    0.0023730       19.470          31.68          129.70     1175.0
## 346    0.0046380       11.050          21.47           71.68      367.0
## 347    0.0041740        9.981          17.70           65.27      302.0
## 348    0.0035260       12.780          26.76           82.66      503.0
## 349    0.0017180       17.580          28.06          113.80      967.0
## 350    0.0036740       12.980          30.36           84.48      513.9
## 351    0.0021040       14.910          19.31           96.53      688.9
## 352    0.0037420       20.010          19.52          134.90     1227.0
## 353    0.0028010       13.890          35.74           88.84      595.7
## 354    0.0024770       13.010          29.15           83.99      518.1
## 355    0.0032240       17.310          33.39          114.60      925.1
## 356    0.0042370       10.410          31.56           67.03      330.7
## 357    0.0024720       10.420          23.22           67.08      331.6
## 358    0.0029220       13.300          24.99           85.22      546.3
## 359    0.0021790       22.880          27.66          153.20     1606.0
## 360    0.0046230        9.845          25.05           62.86      295.8
## 361    0.0039330       24.220          26.17          161.70     1750.0
## 362    0.0030020       16.840          27.66          112.00      876.5
## 363    0.0031360       13.450          38.05           85.08      558.9
## 364    0.0023710       11.380          15.65           73.23      394.5
## 365    0.0034080       12.830          20.92           82.14      495.2
## 366    0.0055120       12.260          19.68           78.78      457.8
## 367    0.0049680       20.470          25.11          132.90     1302.0
## 368    0.0022680       10.670          36.92           68.03      349.9
## 369    0.0019520       12.340          12.87           81.23      467.8
## 370    0.0025500       25.700          24.57          163.10     1972.0
## 371    0.0024800       13.570          21.40           86.67      552.0
## 372    0.0058220       10.010          19.23           65.59      310.1
## 373    0.0022220       13.350          28.46           84.53      544.3
## 374    0.0018580       13.340          27.87           88.83      547.4
## 375    0.0016380       14.340          22.15           91.62      633.5
## 376    0.0048210       13.190          16.36           83.24      534.0
## 377    0.0026260       16.510          32.29          107.40      826.4
## 378    0.0068840       14.180          23.13           95.23      600.5
## 379    0.0016270       12.200          18.99           77.37      458.0
## 380    0.0027840       12.650          21.19           80.88      491.8
## 381    0.0023260       15.630          28.01          100.90      749.1
## 382    0.0019710       10.930          24.22           70.10      362.7
## 383    0.0032490       16.210          29.25          108.40      808.9
## 384    0.0038170       20.210          27.26          132.70     1261.0
## 385    0.0012170       12.470          23.03           79.15      478.6
## 386    0.0058900       10.830          22.04           71.08      357.4
## 387    0.0046140       28.190          28.18          195.90     2384.0
## 388    0.0033170       11.060          24.54           70.76      375.4
## 389    0.0023550       16.990          35.27          108.60      906.5
## 390    0.0025690       17.320          17.76          109.80      928.2
## 391    0.0025560       21.530          38.54          145.40     1437.0
## 392    0.0017730       11.920          38.30           75.19      439.6
## 393    0.0025510       14.670          23.19           96.08      656.7
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## 393    0.0025510       14.670          23.19           96.08      656.7
## 394    0.0034460       23.720          35.90          159.80     1724.0
## 395    0.0016970       15.850          20.20          101.60      773.4
## 396    0.0019700       15.510          19.97           99.66      745.3
## 397    0.0019820       12.640          19.67           81.93      475.7
## 398    0.0021420       16.430          25.84          107.50      830.9
## 399    0.0032880       22.750          34.66          157.60     1540.0
## 400    0.0056670       10.920          26.29           68.81      366.1
## 401    0.0034940       11.240          22.99           74.32      376.5
## 402    0.0040760       14.260          22.75           91.99      632.1
## 403    0.0038960       24.150          30.90          161.40     1813.0
## 404    0.0017110       25.370          23.17          166.80     1946.0
## 405    0.0081330       15.440          25.50          115.00      733.5
## 406    0.0019060       24.310          26.37          161.20     1780.0
## 407    0.0036960       16.970          19.14          113.10      861.5
## 408    0.0022060       12.820          15.97           83.74      510.5
## 409    0.0038840       18.810          27.37          127.10     1095.0
## 410    0.0035400       10.510          19.16           65.74      335.9
## 411    0.0075550       14.390          17.70          105.00      639.1
## 412    0.0020520       12.080          33.75           79.82      452.3
## 413    0.0023600       11.950          20.72           77.79      441.2
## 414    0.0037070       13.330          25.48           86.16      546.7
## 415    0.0020050       13.310          18.26           84.70      533.7
## 416    0.0032110       23.960          30.39          153.90     1740.0
## 417    0.0015880       12.320          22.02           79.93      462.0
## 418    0.0033730       16.670          21.51          111.40      862.1
## 419    0.0042860       24.190          33.81          160.00     1671.0
## 420    0.0046350       13.740          26.38           91.93      591.7
## 421    0.0298400       11.020          19.49           71.04      380.5
## 422    0.0016290       18.100          31.69          117.70     1030.0
## 423    0.0016190       11.990          16.30           76.25      440.8
## 424    0.0104500       10.280          16.38           69.05      300.2
## 425    0.0047840       12.370          17.70           79.12      467.2
## 426    0.0036010       17.090          33.47          111.80      888.3
## 427    0.0031140       12.810          17.72           83.09      496.2
## 428    0.0021680       16.310          20.54          102.30      777.5
## 429    0.0022780       10.650          22.88           67.88      347.3
## 430    0.0086600       17.730          22.66          119.80      928.8
## 431    0.0014650       16.890          35.64          113.20      848.7
## 432    0.0027250       21.860          26.20          142.20     1493.0
## 433    0.0026070       13.670          24.90           87.78      567.9
## 434    0.0052550       22.750          22.88          146.40     1600.0
## 435    0.0049760       12.360          26.87           90.14      476.4
## 436    0.0024760       15.530          18.00           98.40      749.9
## 437    0.0016760       19.960          24.30          129.00     1236.0
## 438    0.0021520       13.880          22.00           90.81      600.6
## 439    0.0027880        9.507          15.40           59.90      274.9
## 440    0.0050610       13.320          26.21           88.91      543.9
## 441    0.0045720       14.420          21.95           99.21      634.3
## 442    0.0025830       15.350          29.09           97.58      729.8
## 443    0.0035200       18.230          24.23          123.50     1025.0
## 444    0.0027870       14.830          18.32           94.94      660.2
## 445    0.0027590       22.510          44.87          141.20     1408.0
## 446    0.0029680       10.230          15.66           65.13      314.9
## 447    0.0030870       15.010          26.34           98.00      706.0
## 448    0.0017550       13.070          22.25           82.74      523.4
## 449    0.0047750       13.250          27.10           86.20      531.2
## 450    0.0044170       22.960          34.49          152.10     1648.0
## 451    0.0028210       11.520          19.80           73.47      395.4
## 452    0.0056720       15.650          39.34          101.70      768.9
## 453    0.0062400       20.820          30.44          142.00     1313.0
## 454    0.0089250       12.790          28.18           83.51      507.2
## 455    0.0022720       13.050          27.21           85.09      522.9
## 456    0.0025280       15.850          19.85          108.60      766.9
## 457    0.0061640       14.080          12.49           91.36      605.5
## 458    0.0022990       32.490          47.16          214.00     3432.0
## 459    0.0033990        9.262          17.04           58.36      259.2
## 460    0.0009683       14.000          29.02           88.18      608.8
## 461    0.0045580       36.040          31.37          251.20     4254.0
## 462    0.0045150       22.660          30.93          145.30     1603.0
## 463    0.0019410       12.090          20.83           79.73      447.1
## 464    0.0025640       15.270          17.50           97.90      706.6
## 465    0.0074440       22.250          21.40          152.40     1461.0
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## 466    0.0060050       12.880         22.91           89.61      515.8
## 467    0.0025850       14.410         20.45           92.00      636.9
## 468    0.0024360       20.380         22.02          133.30     1292.0
## 469    0.0075960       11.280         20.61           71.53      390.4
## 470    0.0028300       15.660         21.58          101.20      750.0
## 471    0.0058750       13.750         23.50           89.04      579.5
## 472    0.0015200       15.980         25.82          102.30      782.1
## 473    0.0017770       13.300         22.81           84.46      545.9
## 474    0.0022560       27.900         45.41          180.20     2477.0
## 475    0.0038830       13.600         33.33           87.24      567.6
## 476    0.0024510       21.840         25.00          140.90     1485.0
## 477    0.0073580       12.570         28.71           87.36      488.4
## 478    0.0022050       25.680         32.07          168.20     2022.0
## 479    0.0028150       16.250         26.19          109.10      809.8
## 480    0.0069950       16.010         32.94          106.00      788.0
## 481    0.0028080       15.700         15.98          102.80      745.5
## 482    0.0044520       16.330         30.86          109.50      826.4
## 483    0.0045600       23.150         34.01          160.50     1670.0
## 484    0.0179200       11.260         24.39           73.07      390.2
## 485    0.0026680       13.280         19.74           83.61      542.5
## 486    0.0073300       17.360         24.17          119.40      915.3
## 487    0.0039130       11.140         25.62           70.88      385.2
## 488    0.0050370       28.400         28.01          206.80     2360.0
## 489    0.0027010       14.500         28.46           95.29      648.3
## 490    0.0044350       13.240         32.82           91.76      508.1
## 491    0.0039960       21.530         26.06          143.40     1426.0
## 492    0.0061850       25.740         39.42          184.60     1821.0
## 493    0.0041680       18.790         17.04          125.00     1102.0
## 494    0.0035340       11.620         26.51           76.43      407.5
## 495    0.0030480        9.565         27.04           62.06      273.9
## 496    0.0032990       15.050         24.37           99.31      674.7
## 497    0.0035700       10.760         26.83           72.22      361.2
## 498    0.0017200       16.230         29.89          105.50      740.7
## 499    0.0052520       25.050         36.27          178.60     1926.0
## 500    0.0033590       18.490         49.54          126.30     1035.0
## 501    0.0017000       19.180         26.56          127.30     1084.0
## 502    0.0030420       19.190         33.88          123.80     1150.0
## 503    0.0041420       20.960         31.48          136.80     1315.0
## 504    0.0122000       10.850         22.82           76.51      351.9
## 505    0.0052170       13.360         25.40           88.14      528.1
## 506    0.0025340       12.360         41.78           78.44      470.9
## 507    0.0013810       14.910         20.65           94.44      684.6
## 508    0.0017790       15.610         17.58          101.70      760.2
## 509    0.0062130       24.290         29.41          179.10     1819.0
## 510    0.0058150       23.170         27.65          157.10     1748.0
## 511    0.0024250       14.500         20.49           96.09      630.5
## 512    0.0027510       20.920         34.69          135.10     1320.0
## 513    0.0056670       16.820         28.12          119.40      888.7
## 514    0.0027350       15.340         16.35           99.71      706.2
## 515    0.0040850       19.380         31.03          129.30     1165.0
## 516    0.0056170       15.200         30.15          105.30      706.0
## 517    0.0035320       24.990         23.41          158.80     1956.0
## 518    0.0045710       23.570         25.53          152.50     1709.0
## 519    0.0051260       20.600         24.13          135.10     1321.0
## 520    0.0041980       14.550         29.16           99.48      639.3
## 521    0.0048300       12.130         21.57           81.41      440.4
## 522    0.0035860       14.970         24.64           96.05      677.9
## 523    0.0017500       17.260         36.91          110.10      931.4
## 524    0.0027830        9.456         30.37           59.16      268.6
## 525    0.0041000        7.930         19.54           50.41      185.2
## 526    0.0021570       13.900         23.64           89.27      597.5
## 527    0.0034070       14.200         31.31           90.67      624.0
## 528    0.0019020       20.580         27.83          129.20     1261.0
## 529    0.0029280       12.360         26.14           79.29      459.3
## 530    0.0029790       11.150         24.62           71.11      380.2
## 531    0.0080150       13.240         27.29           92.20      546.1
## 532    0.0075510        8.678         31.89           54.49      223.6
## 533    0.0011800       13.820         20.96           88.87      586.8
## 534    0.0045840       17.790         28.45          123.50      981.2
## 535    0.0032240       22.630         33.58          148.70     1589.0
## 536    0.0022890       14.090         19.35           93.22      605.8
## 537    0.0023860       12.840         22.47           81.81      506.2
## 538    0.0016610       12.610         26.55           80.92      483.1
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## 539    0.0035990       15.050         24.75           99.17      688.6
## 540    0.0025510       13.060         17.16           82.96      512.5
## 541    0.0025810       19.800         25.05          130.00     1210.0
## 542    0.0039010       10.570         17.84           67.84      326.6
## 543    0.0020150       13.500         23.08           85.56      564.1
## 544    0.0033450       25.300         31.86          171.10     1938.0
## 545    0.0059870       23.370         31.72          170.30     1623.0
## 546    0.0047260       13.740         19.93           88.81      585.4
## 547    0.0056010        9.414         17.07           63.34      270.0
## 548    0.0021330       13.750         25.99           87.82      579.7
## 549    0.0053040       15.300         33.17          100.20      706.7
## 550    0.0024220       13.760         20.70           89.88      582.6
## 551    0.0077310       14.400         27.01           91.63      645.8
## 552    0.0048310       12.120         15.82           79.62      453.5
## 553    0.0100800       15.090         40.68           97.65      711.4
## 554    0.0023180       13.500         27.98           88.52      552.3
## 555    0.0018280       14.350         34.23           91.29      632.9
## 556    0.0040280       26.230         28.74          172.00     2081.0
## 557    0.0014610       12.970         22.46           83.12      508.9
## 558    0.0054440       16.460         18.34          114.10      809.2
## 559    0.0047850       11.350         16.82           72.01      396.5
## 560    0.0019710       16.430         22.74          105.90      829.5
## 561    0.0040220       15.890         30.36          116.20      799.6
## 562    0.0020650       13.750         21.38           91.11      583.1
## 563    0.0018920       15.400         31.98          100.40      734.6
## 564    0.0031070       14.040         21.08           92.80      599.5
## 565    0.0016720       14.900         23.89           95.10      687.6
## 566    0.0067580       10.880         19.48           70.89      357.1
## 567    0.0025750       17.800         28.03          113.80      973.1
## 568    0.0035630       15.800         16.93          103.10      749.9
## 569    0.0043670       22.690         21.84          152.10     1535.0
##      smoothness_worst compactness_worst concavity_worst points_worst
## 1             0.13850           0.12660        0.124200     0.093910
## 2             0.12130           0.25150        0.191600     0.079260
## 3             0.13690           0.14820        0.106700     0.074310
## 4             0.13670           0.18220        0.086690     0.086110
## 5             0.11260           0.17370        0.136200     0.081780
## 6             0.12490           0.19370        0.256000     0.066640
## 7             0.12980           0.25170        0.363000     0.096530
## 8             0.22260           0.52090        0.464600     0.201300
## 9             0.12190           0.14860        0.079870     0.032030
## 10            0.14180           0.22100        0.229900     0.107500
## 11            0.14640           0.35970        0.517900     0.211300
## 12            0.12170           0.17880        0.194300     0.082110
## 13            0.13510           0.35490        0.450400     0.118100
## 14            0.10210           0.06191        0.001845     0.011110
## 15            0.15280           0.18450        0.397700     0.146600
## 16            0.10260           0.31710        0.366200     0.110500
## 17            0.12230           0.19490        0.170900     0.137400
## 18            0.13840           0.12120        0.102000     0.056020
## 19            0.13470           0.33910        0.493200     0.192300
## 20            0.14270           0.25850        0.099150     0.081870
## 21            0.13230           0.10400        0.152100     0.109900
## 22            0.17680           0.32510        0.139500     0.130800
## 23            0.13630           0.16440        0.141200     0.078870
## 24            0.13860           0.28830        0.196000     0.142300
## 25            0.13000           0.20490        0.129500     0.061360
## 26            0.14110           0.35420        0.277900     0.138300
## 27            0.13390           0.17510        0.138100     0.079110
## 28            0.16410           0.61100        0.633500     0.202400
## 29            0.12330           0.34160        0.434100     0.081200
## 30            0.12130           0.16760        0.136400     0.069870
## 31            0.10160           0.05847        0.018240     0.035320
## 32            0.14190           0.15230        0.217700     0.093310
## 33            0.12070           0.47850        0.516500     0.199600
## 34            0.12400           0.17950        0.137700     0.095320
## 35            0.12230           0.19280        0.249200     0.091860
## 36            0.12750           0.31040        0.256900     0.105400
## 37            0.11930           0.23360        0.268700     0.178900
## 38            0.14240           0.25170        0.094200     0.060420
## 39            0.11680           0.21190        0.231800     0.147400
## 40            0.13650           0.47060        0.502600     0.173200
## 41            0.15220           0.29450        0.378800     0.160700
```

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## 41  0.15220  0.29450  0.378800  0.169700
## 42  0.14380  0.38460  0.681000  0.224700
## 43  0.20980  0.86630  0.686900  0.257500
## 44  0.11420  0.19750  0.145000  0.058500
## 45  0.09384  0.20060  0.138400  0.062220
## 46  0.08822  0.19630  0.253500  0.091810
## 47  0.10300  0.06219  0.045800  0.040440
## 48  0.15300  0.59370  0.645100  0.275600
## 49  0.14280  0.25700  0.343800  0.145300
## 50  0.10500  0.21580  0.190400  0.076250
## 51  0.14600  0.43700  0.463600  0.165400
## 52  0.11360  0.36270  0.340200  0.137900
## 53  0.12440  0.17260  0.144900  0.053560
## 54  0.10810  0.24260  0.306400  0.082190
## 55  0.15360  0.41670  0.789200  0.273300
## 56  0.15360  0.47910  0.485800  0.170800
## 57  0.10730  0.27930  0.269000  0.105600
## 58  0.15210  0.10190  0.006920  0.010420
## 59  0.16960  0.42440  0.580300  0.224800
## 60  0.15180  0.37490  0.431600  0.225200
## 61  0.12470  0.74440  0.724200  0.249300
## 62  0.13760  0.38300  0.489000  0.172100
## 63  0.12430  0.17930  0.280300  0.109900
## 64  0.10940  0.20430  0.208500  0.111200
## 65  0.13900  0.59540  0.630500  0.239300
## 66  0.14520  0.23380  0.168800  0.081940
## 67  0.12760  0.13110  0.178600  0.096780
## 68  0.10110  0.07087  0.047460  0.058130
## 69  0.11850  0.17240  0.145600  0.099930
## 70  0.15500  0.29640  0.275800  0.081200
## 71  0.16100  0.42250  0.503000  0.225800
## 72  0.14020  0.14020  0.105500  0.064990
## 73  0.12210  0.37480  0.460900  0.114500
## 74  0.09862  0.09976  0.104800  0.083410
## 75  0.08774  0.17100  0.188200  0.084360
## 76  0.13040  0.24630  0.243400  0.120500
## 77  0.12340  0.24450  0.353800  0.157100
## 78  0.12900  0.09148  0.144400  0.069610
## 79  0.11940  0.22080  0.176900  0.084110
## 80  0.14820  0.37350  0.330100  0.197400
## 81  0.12160  0.16370  0.066480  0.084850
## 82  0.10960  0.16500  0.142300  0.048150
## 83  0.11400  0.16670  0.121200  0.056140
## 84  0.12770  0.30890  0.260400  0.139700
## 85  0.16100  0.24290  0.224700  0.131800
## 86  0.09616  0.11470  0.118600  0.053660
## 87  0.12920  0.20740  0.179100  0.107000
## 88  0.11720  0.14210  0.070030  0.077630
## 89  0.14010  0.26000  0.315500  0.200900
## 90  0.14250  0.25660  0.193500  0.128400
## 91  0.11620  0.05445  0.027580  0.039900
## 92  0.12760  0.25060  0.202800  0.105300
## 93  0.10840  0.18070  0.226000  0.085680
## 94  0.12180  0.10930  0.044620  0.059210
## 95  0.15330  0.93270  0.848800  0.177200
## 96  0.14350  0.44780  0.495600  0.198100
## 97  0.09329  0.23180  0.160400  0.066080
## 98  0.13690  0.17580  0.131600  0.091400
## 99  0.14060  0.14400  0.065720  0.055750
## 100 0.15730  0.60760  0.647600  0.286700
## 101 0.13350  0.25500  0.253400  0.086000
## 102 0.07117  0.02729  0.000000  0.000000
## 103 0.13580  0.15070  0.127500  0.087500
## 104 0.14640  0.18710  0.291400  0.160900
## 105 0.11010  0.15080  0.229800  0.049700
## 106 0.13520  0.20100  0.259600  0.074310
## 107 0.10960  0.20020  0.238800  0.092650
## 108 0.14020  0.23150  0.353500  0.080880
## 109 0.12040  0.16330  0.061940  0.032640
## 110 0.12820  0.11080  0.035820  0.043060
## 111 0.16880  0.26600  0.287300  0.121800
## 112 0.16300  0.43100  0.538100  0.078790
## 113 0.15030  0.22910  0.327200  0.167400
```

```
## 114          0.16510          0.77250        0.694300     0.220800
## 115          0.10850          0.08615        0.055230     0.037150
## 116          0.14360          0.41220        0.503600     0.173900
## 117          0.15520          0.40560        0.496700     0.183800
## 118          0.16810          0.39130        0.555300     0.212100
## 119          0.13530          0.32350        0.361700     0.182000
## 120          0.13430          0.26580        0.257300     0.125800
## 121          0.11570          0.13500        0.081150     0.051040
## 122          0.11780          0.29200        0.386100     0.192000
## 123          0.09545          0.13610        0.072390     0.048150
## 124          0.13630          0.16280        0.286100     0.182000
## 125          0.15310          0.11200        0.098230     0.065480
## 126          0.11440          0.17890        0.122600     0.055090
## 127          0.18620          0.40990        0.637600     0.198600
## 128          0.13120          0.15810        0.267500     0.135900
## 129          0.10210          0.22640        0.320700     0.121800
## 130          0.13800          0.27330        0.423400     0.136200
## 131          0.14190          0.70900        0.901900     0.247500
## 132          0.11470          0.31670        0.366000     0.140700
## 133          0.10720          0.13810        0.106200     0.079580
## 134          0.14100          0.21130        0.410700     0.221600
## 135          0.16620          0.20310        0.125600     0.095140
## 136          0.18050          0.35780        0.469500     0.209500
## 137          0.14600          0.13100        0.000000     0.000000
## 138          0.12750          0.12320        0.086360     0.070250
## 139          0.14490          0.20530        0.392000     0.182700
## 140          0.11440          0.08906        0.092030     0.062960
## 141          0.13380          0.21170        0.344600     0.149000
## 142          0.16220          0.66560        0.711900     0.265400
## 143          0.11660          0.19220        0.321500     0.162800
## 144          0.16400          0.62470        0.692200     0.178500
## 145          0.15250          0.66430        0.553900     0.270100
## 146          0.13560          0.10000        0.088030     0.043060
## 147          0.13960          0.56090        0.396500     0.181000
## 148          0.13380          0.16790        0.166300     0.091230
## 149          0.08409          0.04712        0.022370     0.028320
## 150          0.11840          0.19630        0.193700     0.084420
## 151          0.11040          0.04953        0.019380     0.027840
## 152          0.13980          0.13520        0.020850     0.045890
## 153          0.13120          0.25480        0.209000     0.101200
## 154          0.12850          0.08842        0.043840     0.023810
## 155          0.09983          0.24720        0.222000     0.102100
## 156          0.13330          0.10490        0.114400     0.050520
## 157          0.10500          0.07622        0.106000     0.051850
## 158          0.19090          0.26980        0.402300     0.142400
## 159          0.09794          0.06542        0.039860     0.022220
## 160          0.11620          0.17110        0.228200     0.128200
## 161          0.10060          0.12380        0.135000     0.100100
## 162          0.10280          0.18430        0.154600     0.093140
## 163          0.11530          0.10080        0.052850     0.055560
## 164          0.09861          0.05232        0.014720     0.013890
## 165          0.11990          0.36250        0.379400     0.226400
## 166          0.14720          0.40340        0.534000     0.268800
## 167          0.12970          0.15250        0.163200     0.108700
## 168          0.11340          0.28670        0.229800     0.152800
## 169          0.14780          0.22560        0.300900     0.097220
## 170          0.09711          0.18240        0.156400     0.060190
## 171          0.17860          0.41660        0.500600     0.208800
## 172          0.16130          0.35680        0.406900     0.182700
## 173          0.16540          0.36820        0.267800     0.155600
## 174          0.10050          0.17300        0.145300     0.061890
## 175          0.14010          0.15460        0.264400     0.116000
## 176          0.12890          0.21410        0.173100     0.079260
## 177          0.16240          0.35110        0.387900     0.209100
## 178          0.11200          0.18790        0.207900     0.055560
## 179          0.16790          0.50900        0.734500     0.237800
## 180          0.11230          0.08862        0.114500     0.074310
## 181          0.14290          0.20420        0.137700     0.108000
## 182          0.15000          0.20450        0.282900     0.152000
## 183          0.11700          0.10720        0.037320     0.058020
## 184          0.14910          0.33310        0.332700     0.125200
## 185          0.14240          0.09669        0.013350     0.020220
## 186          0.09312          0.07506        0.028840     0.031940
```

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## 187         0.17030          0.39340        0.501800     0.254300
## 188         0.14650          0.22750        0.396500     0.137900
## 189         0.10540          0.15370        0.260600     0.142500
## 190         0.14670          0.09370        0.040430     0.051590
## 191         0.13140          0.22360        0.280200     0.121600
## 192         0.13740          0.15750        0.151400     0.068760
## 193         0.10650          0.27910        0.315100     0.114700
## 194         0.16780          0.65770        0.702600     0.171200
## 195         0.14140          0.35470        0.290200     0.154100
## 196         0.13920          0.28170        0.243200     0.184100
## 197         0.16600          0.23560        0.402900     0.152600
## 198         0.11150          0.17660        0.091890     0.069460
## 199         0.16240          0.31240        0.265400     0.142700
## 200         0.10260          0.24310        0.307600     0.091400
## 201         0.09387          0.05131        0.023980     0.028990
## 202         0.13030          0.16960        0.192700     0.074850
## 203         0.10770          0.33450        0.311400     0.130800
## 204         0.12870          0.22500        0.221600     0.110500
## 205         0.14600          0.11150        0.108700     0.078640
## 206         0.17320          0.49670        0.591100     0.216300
## 207         0.13420          0.18080        0.186000     0.082880
## 208         0.11370          0.07974        0.061200     0.071600
## 209         0.09023          0.05836        0.013790     0.022100
## 210         0.14910          0.75840        0.678000     0.290300
## 211         0.09926          0.23170        0.334400     0.101700
## 212         0.13680          0.42900        0.358700     0.183400
## 213         0.15850          0.73940        0.656600     0.189900
## 214         0.11660          0.26850        0.286600     0.091730
## 215         0.13320          0.38980        0.336500     0.079660
## 216         0.12750          0.09866        0.021680     0.025790
## 217         0.14750          0.19790        0.142300     0.080450
## 218         0.11530          0.34290        0.251200     0.133900
## 219         0.17910          0.52490        0.535500     0.174100
## 220         0.12280          0.35830        0.394800     0.234600
## 221         0.12980          0.14720        0.052330     0.063430
## 222         0.13140          0.16070        0.093850     0.082240
## 223         0.14950          0.41160        0.612100     0.198000
## 224         0.15570          0.16760        0.175500     0.061270
## 225         0.10760          0.06791        0.000000     0.000000
## 226         0.13470          0.07767        0.000000     0.000000
## 227         0.20060          0.36630        0.291300     0.107500
## 228         0.16650          0.29420        0.530800     0.217300
## 229         0.13810          0.34200        0.350800     0.193900
## 230         0.11660          0.09794        0.005518     0.016670
## 231         0.14060          0.20310        0.292300     0.068350
## 232         0.10480          0.06744        0.049210     0.047930
## 233         0.08949          0.41930        0.678300     0.150500
## 234         0.15900          0.29470        0.359700     0.158300
## 235         0.12340          0.10640        0.086530     0.064980
## 236         0.15260          0.14770        0.149000     0.098150
## 237         0.13160          0.46480        0.458900     0.172700
## 238         0.16410          0.22350        0.175400     0.085120
## 239         0.14990          0.13980        0.112500     0.061360
## 240         0.15150          0.10260        0.118100     0.067360
## 241         0.15120          0.32620        0.320900     0.137400
## 242         0.17240          0.23640        0.245600     0.105000
## 243         0.10860          0.18870        0.186800     0.025640
## 244         0.12400          0.14860        0.121100     0.082350
## 245         0.17100          0.59550        0.848900     0.250700
## 246         0.11990          0.09546        0.093500     0.038460
## 247         0.11260          0.07094        0.012350     0.025790
## 248         0.13400          0.42020        0.404000     0.120500
## 249         0.12970          0.13570        0.068800     0.025640
## 250         0.12080          0.18560        0.181100     0.071160
## 251         0.11350          0.21760        0.185600     0.101800
## 252         0.15040          0.51720        0.618100     0.246200
## 253         0.11020          0.28090        0.302100     0.082720
## 254         0.18730          0.59170        0.903400     0.196400
## 255         0.13940          0.13640        0.155900     0.101500
## 256         0.15260          0.11930        0.061410     0.037700
## 257         0.10890          0.26490        0.377900     0.095940
## 258         0.14530          0.16220        0.181100     0.086980
## 259         0.12960          0.07061        0.103900     0.058820
```

```
## 259          0.12960          0.07061          0.103900     0.058820
## 260          0.14400          0.17730          0.239000     0.128800
## 261          0.14320          0.17730          0.160300     0.062660
## 262          0.13840          0.17100          0.200000     0.091270
## 263          0.15460          0.23940          0.379100     0.151400
## 264          0.10640          0.14150          0.167300     0.081500
## 265          0.16340          0.35590          0.558800     0.184700
## 266          0.17030          0.54010          0.539000     0.206000
## 267          0.09527          0.13970          0.192500     0.035710
## 268          0.12070          0.24360          0.143400     0.047860
## 269          0.12560          0.18040          0.123000     0.063350
## 270          0.14630          0.29680          0.345800     0.156400
## 271          0.09534          0.18120          0.190100     0.082960
## 272          0.10370          0.39030          0.363900     0.176700
## 273          0.10660          0.12310          0.084600     0.079110
## 274          0.11760          0.18430          0.170300     0.086600
## 275          0.13220          0.56010          0.386500     0.170800
## 276          0.11420          0.15160          0.320100     0.159500
## 277          0.12160          0.13880          0.170000     0.101700
## 278          0.11390          0.30940          0.340300     0.141800
## 279          0.10010          0.07348          0.000000     0.000000
## 280          0.12560          0.08340          0.000000     0.000000
## 281          0.14780          0.56340          0.378600     0.210200
## 282          0.11080          0.07723          0.025330     0.028320
## 283          0.12890          0.13520          0.045060     0.050930
## 284          0.12780          0.12910          0.153300     0.092220
## 285          0.15580          0.25670          0.388900     0.198400
## 286          0.11420          0.20700          0.243700     0.078280
## 287          0.15590          0.40590          0.374400     0.177200
## 288          0.14170          0.33090          0.418500     0.161300
## 289          0.12110          0.31720          0.699100     0.210500
## 290          0.15330          0.38420          0.358200     0.140700
## 291          0.10730          0.07158          0.000000     0.000000
## 292          0.11050          0.20960          0.134600     0.069870
## 293          0.17370          0.31220          0.380900     0.167300
## 294          0.13680          0.21700          0.241300     0.088290
## 295          0.12940          0.38850          0.475600     0.243200
## 296          0.13420          0.41880          0.465800     0.247500
## 297          0.12680          0.31350          0.443300     0.214800
## 298          0.15120          0.31500          0.537200     0.238800
## 299          0.15210          0.16320          0.162200     0.073930
## 300          0.13770          0.44620          0.589700     0.177500
## 301          0.11240          0.20160          0.226400     0.177700
## 302          0.09445          0.21670          0.156500     0.075300
## 303          0.11710          0.08294          0.018540     0.039530
## 304          0.15740          0.38560          0.510600     0.205100
## 305          0.15520          0.44800          0.397600     0.147900
## 306          0.12230          0.27610          0.414600     0.156300
## 307          0.14170          0.79170          1.170000     0.235600
## 308          0.11720          0.19580          0.181000     0.083880
## 309          0.09970          0.25210          0.250000     0.084050
## 310          0.13760          0.26980          0.257700     0.090900
## 311          0.10970          0.25340          0.309200     0.161300
## 312          0.14160          0.24050          0.337800     0.185700
## 313          0.11990          0.13460          0.174200     0.090770
## 314          0.13590          0.08368          0.071530     0.089460
## 315          0.15300          0.37240          0.366400     0.149200
## 316          0.11080          0.14570          0.079340     0.057810
## 317          0.13740          0.20500          0.400000     0.162500
## 318          0.14810          0.41260          0.582000     0.259300
## 319          0.10870          0.17820          0.156400     0.064130
## 320          0.12200          0.20090          0.215100     0.125100
## 321          0.11750          0.40610          0.489600     0.134200
## 322          0.15630          0.38350          0.540900     0.181300
## 323          0.11900          0.35390          0.409800     0.157300
## 324          0.15000          0.23990          0.150300     0.072470
## 325          0.10370          0.07776          0.062430     0.040520
## 326          0.13980          0.20890          0.315700     0.164200
## 327          0.12870          0.15130          0.062310     0.079630
## 328          0.18550          0.49250          0.735600     0.203400
## 329          0.12970          0.11050          0.081120     0.062960
## 330          0.15150          0.26780          0.481900     0.208900
## 331          0.12340          0.07204          0.000000     0.000000
```

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## 332          0.12140          0.16520        0.071270     0.063840
## 333          0.14360          0.12570        0.104700     0.046030
## 334          0.10010          0.05332        0.041160     0.018520
## 335          0.14110          0.21640        0.335500     0.166700
## 336          0.12220          0.21860        0.296200     0.103500
## 337          0.09293          0.04327        0.003581     0.016350
## 338          0.14820          0.43650        1.252000     0.175000
## 339          0.14980          0.48270        0.463400     0.204800
## 340          0.15410          0.29790        0.400400     0.145200
## 341          0.12060          0.17220        0.231000     0.112900
## 342          0.12490          0.32060        0.575500     0.195600
## 343          0.14260          0.21160        0.334400     0.104700
## 344          0.13470          0.48480        0.743600     0.121800
## 345          0.13950          0.30550        0.299200     0.131200
## 346          0.14670          0.17650        0.130000     0.053340
## 347          0.10150          0.12480        0.094410     0.047620
## 348          0.14130          0.17920        0.077080     0.064020
## 349          0.12460          0.21010        0.286600     0.112000
## 350          0.13110          0.18220        0.160900     0.120200
## 351          0.10340          0.10170        0.062600     0.082160
## 352          0.12550          0.28120        0.248900     0.145600
## 353          0.12270          0.16200        0.243900     0.064930
## 354          0.16990          0.21960        0.312000     0.082780
## 355          0.16480          0.34160        0.302400     0.161400
## 356          0.15480          0.16640        0.094120     0.065170
## 357          0.14150          0.12470        0.062130     0.055880
## 358          0.12800          0.18800        0.147100     0.069130
## 359          0.14420          0.25760        0.378400     0.193200
## 360          0.11030          0.08298        0.079930     0.025640
## 361          0.12280          0.23110        0.315800     0.144500
## 362          0.11310          0.19240        0.232200     0.111900
## 363          0.09422          0.05213        0.000000     0.000000
## 364          0.13430          0.16500        0.086150     0.066960
## 365          0.11400          0.09358        0.049800     0.058820
## 366          0.13450          0.21180        0.179700     0.069180
## 367          0.14180          0.34980        0.358300     0.151500
## 368          0.11100          0.11090        0.071900     0.048660
## 369          0.10920          0.16260        0.083240     0.047150
## 370          0.14970          0.31610        0.431700     0.199900
## 371          0.15800          0.17510        0.188900     0.084110
## 372          0.09836          0.16780        0.139700     0.050870
## 373          0.12220          0.09052        0.036190     0.039830
## 374          0.12080          0.22790        0.162000     0.056900
## 375          0.12250          0.15170        0.188700     0.098510
## 376          0.09439          0.06477        0.016740     0.026800
## 377          0.10600          0.13760        0.161100     0.109500
## 378          0.14270          0.35930        0.320600     0.098040
## 379          0.12590          0.07348        0.004955     0.011110
## 380          0.13890          0.15820        0.180400     0.096080
## 381          0.11180          0.11410        0.047530     0.058900
## 382          0.11430          0.08614        0.041580     0.031250
## 383          0.13060          0.19760        0.334900     0.122500
## 384          0.14460          0.58040        0.527400     0.186400
## 385          0.14830          0.15740        0.162400     0.085420
## 386          0.14610          0.22460        0.178300     0.083330
## 387          0.12720          0.47250        0.580700     0.184100
## 388          0.14130          0.10440        0.084230     0.065280
## 389          0.12650          0.19430        0.316900     0.118400
## 390          0.13540          0.13610        0.194700     0.135700
## 391          0.14010          0.37620        0.639900     0.197000
## 392          0.09267          0.05494        0.000000     0.000000
## 393          0.10890          0.15820        0.105000     0.085860
## 394          0.17820          0.38410        0.575400     0.187200
## 395          0.12640          0.15640        0.120600     0.087040
## 396          0.08484          0.12330        0.109100     0.045370
## 397          0.14150          0.21700        0.230200     0.110500
## 398          0.12570          0.19970        0.284600     0.147600
## 399          0.12180          0.34580        0.473400     0.225500
## 400          0.13160          0.09473        0.020490     0.023810
## 401          0.14190          0.22430        0.084340     0.065280
## 402          0.10250          0.25310        0.330800     0.089780
## 403          0.15090          0.65900        0.609100     0.178500
## 404          0.15620          0.30550        0.415900     0.211200
```

```
## 405          0.12010          0.56460        0.655600     0.135700
## 406          0.13270          0.23760        0.270200     0.176500
## 407          0.12350          0.25500        0.211400     0.125100
## 408          0.15480          0.23900        0.210200     0.089580
## 409          0.18780          0.44800        0.470400     0.202700
## 410          0.15040          0.09515        0.071610     0.072220
## 411          0.12540          0.58490        0.772700     0.156100
## 412          0.09203          0.14320        0.108900     0.020830
## 413          0.10760          0.12230        0.097550     0.034130
## 414          0.12710          0.10280        0.104600     0.069680
## 415          0.10360          0.08500        0.067350     0.082900
## 416          0.15140          0.37250        0.593600     0.206000
## 417          0.11900          0.16480        0.139900     0.084760
## 418          0.12940          0.33710        0.375500     0.141400
## 419          0.12780          0.34160        0.370300     0.215200
## 420          0.13850          0.40920        0.450400     0.186500
## 421          0.12920          0.27720        0.821600     0.157100
## 422          0.13890          0.20570        0.271200     0.153000
## 423          0.13410          0.08971        0.071160     0.055060
## 424          0.19020          0.34410        0.209900     0.102500
## 425          0.11210          0.16100        0.164800     0.062960
## 426          0.18510          0.40610        0.402400     0.171600
## 427          0.12930          0.18850        0.031220     0.047660
## 428          0.12180          0.15500        0.122000     0.079710
## 429          0.12650          0.12000        0.010050     0.022320
## 430          0.17650          0.45030        0.442900     0.222900
## 431          0.14710          0.28840        0.379600     0.132900
## 432          0.14920          0.25360        0.375900     0.151000
## 433          0.13770          0.20030        0.226700     0.076320
## 434          0.14120          0.30890        0.353300     0.166300
## 435          0.13910          0.40820        0.477900     0.155500
## 436          0.12810          0.11090        0.053070     0.058900
## 437          0.12430          0.11600        0.221000     0.129400
## 438          0.10970          0.15060        0.176400     0.082350
## 439          0.17330          0.12390        0.116800     0.044190
## 440          0.13580          0.18920        0.195600     0.079090
## 441          0.12880          0.32530        0.343900     0.098580
## 442          0.12160          0.15170        0.104900     0.071740
## 443          0.15510          0.42030        0.520300     0.211500
## 444          0.13930          0.24990        0.184800     0.133500
## 445          0.13650          0.37350        0.324100     0.206600
## 446          0.13240          0.11480        0.088670     0.062270
## 447          0.09368          0.14420        0.135900     0.061060
## 448          0.10130          0.07390        0.007732     0.027960
## 449          0.14050          0.30460        0.280600     0.113800
## 450          0.16000          0.24440        0.263900     0.155500
## 451          0.13410          0.11530        0.026390     0.044640
## 452          0.17850          0.47060        0.442500     0.145900
## 453          0.12510          0.24140        0.382900     0.182500
## 454          0.09457          0.33990        0.321800     0.087500
## 455          0.14260          0.21870        0.116400     0.082630
## 456          0.13160          0.27350        0.310300     0.159900
## 457          0.14510          0.13790        0.085390     0.074070
## 458          0.14010          0.26440        0.344200     0.165900
## 459          0.11620          0.07057        0.000000     0.000000
## 460          0.08125          0.03432        0.007977     0.009259
## 461          0.13570          0.42560        0.683300     0.262500
## 462          0.13900          0.34630        0.391200     0.170800
## 463          0.10950          0.19820        0.155300     0.067540
## 464          0.10720          0.10710        0.035170     0.033120
## 465          0.15450          0.39490        0.385300     0.255000
## 466          0.14500          0.26290        0.240300     0.073700
## 467          0.11280          0.13460        0.011200     0.025000
## 468          0.12630          0.26660        0.429000     0.153500
## 469          0.14020          0.23600        0.189800     0.097440
## 470          0.11950          0.12520        0.111700     0.074530
## 471          0.09388          0.08978        0.051860     0.047730
## 472          0.10450          0.09995        0.077500     0.057540
## 473          0.09701          0.04619        0.048330     0.050130
## 474          0.14080          0.40970        0.399500     0.162500
## 475          0.10410          0.09726        0.055240     0.055470
## 476          0.14340          0.27630        0.385300     0.177600
## 477          0.08709          0.32140        0.291200     0.109200
```

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## 477          0.08799          0.32140          0.291200     0.109200
## 478          0.13680          0.31010          0.439900     0.228000
## 479          0.13130          0.30300          0.180400     0.148900
## 480          0.17940          0.39660          0.338100     0.152100
## 481          0.13130          0.17880          0.256000     0.122100
## 482          0.14310          0.30260          0.319400     0.156500
## 483          0.14910          0.42570          0.613300     0.184800
## 484          0.13010          0.29500          0.348600     0.099100
## 485          0.09958          0.06476          0.030460     0.042620
## 486          0.15500          0.50460          0.687200     0.213500
## 487          0.12340          0.15420          0.127700     0.065600
## 488          0.17010          0.69970          0.960800     0.291000
## 489          0.11180          0.16460          0.076980     0.041950
## 490          0.21840          0.93790          0.840200     0.252400
## 491          0.13090          0.23270          0.254400     0.148900
## 492          0.16500          0.86810          0.938700     0.265000
## 493          0.15310          0.35830          0.583000     0.182700
## 494          0.14280          0.25100          0.212300     0.098610
## 495          0.16390          0.16980          0.090010     0.027780
## 496          0.14560          0.29610          0.124600     0.109600
## 497          0.15590          0.23020          0.264400     0.097490
## 498          0.15030          0.39040          0.372800     0.160700
## 499          0.12810          0.53290          0.425100     0.194100
## 500          0.18830          0.55640          0.570300     0.201400
## 501          0.10090          0.29200          0.247700     0.087370
## 502          0.11810          0.15510          0.145900     0.099750
## 503          0.17890          0.42330          0.478400     0.207300
## 504          0.11430          0.36190          0.603000     0.146500
## 505          0.17800          0.28780          0.318600     0.141600
## 506          0.09994          0.06885          0.023180     0.030020
## 507          0.08567          0.05036          0.038660     0.033330
## 508          0.11390          0.10110          0.110100     0.079550
## 509          0.14070          0.41860          0.659900     0.254200
## 510          0.15170          0.40020          0.421100     0.213400
## 511          0.13120          0.27760          0.189000     0.072830
## 512          0.13150          0.18060          0.208000     0.113600
## 513          0.16370          0.57750          0.695600     0.154600
## 514          0.13110          0.24740          0.175900     0.080560
## 515          0.14150          0.46650          0.708700     0.224800
## 516          0.17770          0.53430          0.628200     0.197700
## 517          0.12380          0.18660          0.241600     0.186000
## 518          0.14440          0.42450          0.450400     0.243000
## 519          0.12800          0.22970          0.262300     0.132500
## 520          0.13490          0.44020          0.316200     0.112600
## 521          0.13270          0.29960          0.293900     0.093100
## 522          0.14260          0.23780          0.267100     0.101500
## 523          0.11480          0.09866          0.154700     0.065750
## 524          0.08996          0.06444          0.000000     0.000000
## 525          0.15840          0.12020          0.000000     0.000000
## 526          0.12560          0.18080          0.199200     0.057800
## 527          0.12270          0.34540          0.391100     0.118000
## 528          0.10720          0.12020          0.224900     0.118500
## 529          0.11180          0.09708          0.075290     0.062030
## 530          0.13880          0.12550          0.064090     0.025000
## 531          0.11160          0.28130          0.236500     0.115500
## 532          0.15960          0.30640          0.339300     0.050000
## 533          0.10680          0.09605          0.034690     0.036120
## 534          0.14150          0.46670          0.586200     0.203500
## 535          0.12750          0.38610          0.567300     0.173200
## 536          0.13260          0.26100          0.347600     0.097830
## 537          0.12490          0.08720          0.090760     0.063160
## 538          0.12230          0.10870          0.079150     0.057410
## 539          0.12640          0.20370          0.137700     0.068450
## 540          0.14310          0.18510          0.192200     0.084490
## 541          0.11110          0.14860          0.193200     0.109600
## 542          0.18500          0.20970          0.099960     0.072620
## 543          0.10380          0.06624          0.005579     0.008772
## 544          0.15920          0.44920          0.534400     0.268500
## 545          0.16390          0.61640          0.768100     0.250800
## 546          0.14830          0.20680          0.224100     0.105600
## 547          0.11790          0.18790          0.154400     0.038460
## 548          0.12980          0.18390          0.125500     0.083120
## 549          0.12410          0.22640          0.132600     0.104800
```

```
## 550          0.14940           0.21560         0.305000      0.065480
## 551          0.09402           0.19360         0.183800      0.056010
## 552          0.08864           0.12560         0.120100      0.039220
## 553          0.18530           1.05800         1.105000      0.221000
## 554          0.13490           0.18540         0.136600      0.101000
## 555          0.12890           0.10630         0.139000      0.060050
## 556          0.15020           0.57170         0.705300      0.242200
## 557          0.11830           0.10490         0.081050      0.065440
## 558          0.13120           0.36350         0.321900      0.110800
## 559          0.12160           0.08240         0.039380      0.043060
## 560          0.12260           0.18810         0.206000      0.083080
## 561          0.14460           0.42380         0.518600      0.144700
## 562          0.12560           0.19280         0.116700      0.055560
## 563          0.10170           0.14600         0.147200      0.055630
## 564          0.15470           0.22310         0.179100      0.115500
## 565          0.12820           0.19650         0.187600      0.104500
## 566          0.13600           0.16360         0.071620      0.040740
## 567          0.13010           0.32990         0.363000      0.122600
## 568          0.13470           0.14780         0.137300      0.106900
## 569          0.11920           0.28400         0.402400      0.196600
##     symmetry_worst dimension_worst
## 1           0.2827         0.06771
## 2           0.2940         0.07587
## 3           0.2998         0.07881
## 4           0.2102         0.06784
## 5           0.2487         0.06766
## 6           0.3035         0.08284
## 7           0.2112         0.08732
## 8           0.4432         0.10860
## 9           0.2826         0.07552
## 10          0.3301         0.09080
## 11          0.2480         0.08999
## 12          0.3113         0.08132
## 13          0.2563         0.08174
## 14          0.2439         0.06289
## 15          0.2293         0.06091
## 16          0.2258         0.08004
## 17          0.2723         0.07071
## 18          0.2688         0.06888
## 19          0.3294         0.09469
## 20          0.3469         0.09241
## 21          0.2572         0.07097
## 22          0.2803         0.09970
## 23          0.2251         0.07732
## 24          0.2590         0.07779
## 25          0.2383         0.09026
## 26          0.2589         0.10300
## 27          0.2678         0.06603
## 28          0.4027         0.09876
## 29          0.2982         0.09825
## 30          0.2741         0.07582
## 31          0.2107         0.06580
## 32          0.2829         0.08067
## 33          0.2301         0.12240
## 34          0.3455         0.06896
## 35          0.2626         0.07048
## 36          0.3387         0.09638
## 37          0.2551         0.06589
## 38          0.2727         0.10360
## 39          0.2810         0.07228
## 40          0.2770         0.10630
## 41          0.3151         0.07999
## 42          0.3643         0.09223
## 43          0.6638         0.17300
## 44          0.2432         0.10090
## 45          0.2679         0.07698
## 46          0.2369         0.06558
## 47          0.2383         0.07083
## 48          0.3690         0.08815
## 49          0.2666         0.07686
## 50          0.2685         0.07764
## 51          0.3630         0.10590
## 52          0.2954         0.08362
```

```
## 53          0.2779          0.08121
## 54          0.1890          0.07796
## 55          0.3198          0.08762
## 56          0.3527          0.10160
## 57          0.2604          0.09879
## 58          0.2933          0.07697
## 59          0.3222          0.08009
## 60          0.3590          0.07787
## 61          0.4670          0.10380
## 62          0.2160          0.09300
## 63          0.1603          0.06818
## 64          0.2994          0.07146
## 65          0.4667          0.09946
## 66          0.2268          0.09082
## 67          0.2506          0.07623
## 68          0.2530          0.05695
## 69          0.2955          0.06912
## 70          0.3206          0.08950
## 71          0.2807          0.10710
## 72          0.2894          0.07664
## 73          0.3135          0.10550
## 74          0.1783          0.05871
## 75          0.2527          0.05972
## 76          0.2972          0.09261
## 77          0.3206          0.06938
## 78          0.2400          0.06641
## 79          0.2564          0.08253
## 80          0.3060          0.08503
## 81          0.2404          0.06428
## 82          0.2482          0.06306
## 83          0.2637          0.06658
## 84          0.3151          0.08473
## 85          0.3343          0.09215
## 86          0.2309          0.06915
## 87          0.3110          0.07592
## 88          0.2196          0.07675
## 89          0.2822          0.07526
## 90          0.2849          0.09031
## 91          0.1783          0.07319
## 92          0.3035          0.07661
## 93          0.2683          0.06829
## 94          0.2306          0.06291
## 95          0.5166          0.14460
## 96          0.3019          0.09124
## 97          0.3207          0.07247
## 98          0.3101          0.07007
## 99          0.3055          0.08797
## 100         0.2355          0.10510
## 101         0.2605          0.08701
## 102         0.1909          0.06559
## 103         0.2733          0.08022
## 104         0.3029          0.08216
## 105         0.2767          0.07198
## 106         0.2941          0.09180
## 107         0.2121          0.07188
## 108         0.2709          0.08839
## 109         0.3059          0.07626
## 110         0.2976          0.07123
## 111         0.2806          0.09097
## 112         0.3322          0.14860
## 113         0.2894          0.08456
## 114         0.3596          0.14310
## 115         0.2433          0.06563
## 116         0.2500          0.07944
## 117         0.4753          0.10130
## 118         0.3187          0.10190
## 119         0.3070          0.08255
## 120         0.3113          0.08317
## 121         0.2364          0.07182
## 122         0.2909          0.05865
## 123         0.3244          0.06745
## 124         0.2510          0.06494
## 125         0.2851          0.08763
```

```
## 125          0.2851          0.08763
## 126          0.2208          0.07638
## 127          0.3147          0.14050
## 128          0.2477          0.06836
## 129          0.2841          0.06541
## 130          0.2698          0.08351
## 131          0.2866          0.11550
## 132          0.2744          0.08839
## 133          0.2473          0.06443
## 134          0.2060          0.07115
## 135          0.2780          0.11680
## 136          0.3613          0.09564
## 137          0.2445          0.08865
## 138          0.2514          0.07898
## 139          0.2623          0.07599
## 140          0.2785          0.07408
## 141          0.2341          0.07421
## 142          0.4601          0.11890
## 143          0.2572          0.06637
## 144          0.2844          0.11320
## 145          0.4264          0.12750
## 146          0.3200          0.06576
## 147          0.3792          0.10480
## 148          0.2394          0.06469
## 149          0.1901          0.05932
## 150          0.2983          0.07185
## 151          0.1917          0.06174
## 152          0.3196          0.08009
## 153          0.3549          0.08118
## 154          0.2681          0.07399
## 155          0.2272          0.08799
## 156          0.2454          0.08136
## 157          0.2335          0.06263
## 158          0.2964          0.09606
## 159          0.2699          0.06736
## 160          0.2871          0.06917
## 161          0.2027          0.06206
## 162          0.2955          0.07009
## 163          0.2362          0.07113
## 164          0.2991          0.07804
## 165          0.2908          0.07277
## 166          0.2856          0.08082
## 167          0.3062          0.06072
## 168          0.3067          0.07484
## 169          0.3849          0.08633
## 170          0.2350          0.07014
## 171          0.3900          0.11790
## 172          0.3179          0.10550
## 173          0.3196          0.11510
## 174          0.2446          0.07024
## 175          0.2884          0.07371
## 176          0.2779          0.07918
## 177          0.3537          0.08294
## 178          0.2590          0.09158
## 179          0.3799          0.09185
## 180          0.2694          0.06878
## 181          0.2668          0.08174
## 182          0.2650          0.06387
## 183          0.2823          0.06794
## 184          0.3415          0.09740
## 185          0.3292          0.06522
## 186          0.2143          0.06643
## 187          0.3109          0.09061
## 188          0.3109          0.07610
## 189          0.3055          0.05933
## 190          0.2841          0.08175
## 191          0.2792          0.08158
## 192          0.2460          0.07262
## 193          0.2688          0.08273
## 194          0.4218          0.13410
## 195          0.3437          0.08631
## 196          0.2311          0.09203
## 197          0.2654          0.09438
```

```
## 198         0.2522         0.07246
## 199         0.3518         0.08665
## 200         0.2677         0.08824
## 201         0.1565         0.05504
## 202         0.2965         0.07662
## 203         0.3163         0.09251
## 204         0.2226         0.08486
## 205         0.2765         0.07806
## 206         0.3013         0.10670
## 207         0.3210         0.07863
## 208         0.1978         0.06915
## 209         0.2267         0.06192
## 210         0.4098         0.12840
## 211         0.1999         0.07127
## 212         0.3698         0.10940
## 213         0.3313         0.13390
## 214         0.2736         0.07320
## 215         0.2581         0.10800
## 216         0.3557         0.08020
## 217         0.3071         0.08557
## 218         0.2534         0.07858
## 219         0.3985         0.12440
## 220         0.3589         0.09187
## 221         0.2369         0.06922
## 222         0.2775         0.09464
## 223         0.2968         0.09929
## 224         0.2762         0.08851
## 225         0.2710         0.06164
## 226         0.3142         0.08116
## 227         0.2848         0.13640
## 228         0.3032         0.08075
## 229         0.2928         0.07867
## 230         0.2815         0.07418
## 231         0.2884         0.07220
## 232         0.2298         0.05974
## 233         0.2398         0.10820
## 234         0.3103         0.08200
## 235         0.2407         0.06484
## 236         0.2804         0.08024
## 237         0.3000         0.08701
## 238         0.2983         0.10490
## 239         0.3409         0.08147
## 240         0.2883         0.07748
## 241         0.3068         0.07957
## 242         0.2926         0.10170
## 243         0.2376         0.09206
## 244         0.2452         0.06515
## 245         0.2749         0.12970
## 246         0.2552         0.07920
## 247         0.2349         0.08061
## 248         0.3187         0.10230
## 249         0.3105         0.07409
## 250         0.2447         0.08194
## 251         0.2177         0.08549
## 252         0.3277         0.10190
## 253         0.2157         0.10430
## 254         0.3245         0.11980
## 255         0.2160         0.07253
## 256         0.2872         0.08304
## 257         0.2471         0.07463
## 258         0.2973         0.07745
## 259         0.2383         0.06410
## 260         0.2977         0.07259
## 261         0.3049         0.07081
## 262         0.2226         0.08283
## 263         0.2837         0.08019
## 264         0.2356         0.07603
## 265         0.3530         0.08482
## 266         0.4378         0.10720
## 267         0.2868         0.07809
## 268         0.2254         0.10840
## 269         0.3100         0.08203
## 270         0.2920         0.07614
```

```
## 271         0.1988         0.07053
## 272         0.3176         0.10230
## 273         0.2523         0.06609
## 274         0.2618         0.07609
## 275         0.3193         0.09221
## 276         0.1648         0.05525
## 277         0.2369         0.06599
## 278         0.2218         0.07820
## 279         0.2458         0.06592
## 280         0.3058         0.09938
## 281         0.3751         0.11080
## 282         0.2557         0.07613
## 283         0.2880         0.08083
## 284         0.2530         0.06510
## 285         0.3216         0.07570
## 286         0.2455         0.06596
## 287         0.4724         0.10260
## 288         0.2549         0.09136
## 289         0.3126         0.07849
## 290         0.3230         0.10330
## 291         0.2475         0.06969
## 292         0.3323         0.07701
## 293         0.3080         0.09333
## 294         0.3218         0.07470
## 295         0.2741         0.08574
## 296         0.3157         0.09671
## 297         0.3077         0.07569
## 298         0.2768         0.07615
## 299         0.2781         0.08052
## 300         0.3318         0.09136
## 301         0.2443         0.06251
## 302         0.2636         0.07676
## 303         0.2738         0.07685
## 304         0.3585         0.11090
## 305         0.3993         0.10640
## 306         0.2437         0.08328
## 307         0.4089         0.14090
## 308         0.3297         0.07834
## 309         0.2852         0.09218
## 310         0.3065         0.08177
## 311         0.3220         0.06386
## 312         0.3138         0.08113
## 313         0.2518         0.06960
## 314         0.2220         0.06033
## 315         0.3739         0.10270
## 316         0.2694         0.07061
## 317         0.2364         0.07678
## 318         0.3103         0.08677
## 319         0.3169         0.08032
## 320         0.3109         0.08187
## 321         0.3231         0.10340
## 322         0.4863         0.08633
## 323         0.3689         0.08368
## 324         0.2438         0.08541
## 325         0.2901         0.06783
## 326         0.3695         0.08579
## 327         0.2226         0.07617
## 328         0.3274         0.12520
## 329         0.3196         0.06435
## 330         0.2593         0.07738
## 331         0.3105         0.08151
## 332         0.3313         0.07735
## 333         0.2090         0.07699
## 334         0.2293         0.06037
## 335         0.3414         0.07147
## 336         0.2320         0.07474
## 337         0.2233         0.05521
## 338         0.4228         0.11750
## 339         0.3679         0.09870
## 340         0.2557         0.08181
## 341         0.2778         0.07012
## 342         0.3956         0.09288
## 343         0.2736         0.07053
```

```
## 343          0.2736          0.07953
## 344          0.3308          0.12970
## 345          0.3480          0.07619
## 346          0.2533          0.08468
## 347          0.2434          0.07431
## 348          0.2584          0.08096
## 349          0.2282          0.06954
## 350          0.2599          0.08251
## 351          0.2136          0.06710
## 352          0.2756          0.07919
## 353          0.2372          0.07242
## 354          0.2829          0.08832
## 355          0.3321          0.08911
## 356          0.2878          0.09211
## 357          0.2989          0.07380
## 358          0.2535          0.07993
## 359          0.3063          0.08368
## 360          0.2435          0.07393
## 361          0.2238          0.07127
## 362          0.2809          0.06287
## 363          0.2409          0.06743
## 364          0.2937          0.07722
## 365          0.2227          0.07376
## 366          0.2329          0.08134
## 367          0.2463          0.07738
## 368          0.2321          0.07211
## 369          0.3390          0.07434
## 370          0.3379          0.08950
## 371          0.3155          0.07538
## 372          0.3282          0.08490
## 373          0.2554          0.07207
## 374          0.2406          0.07729
## 375          0.3270          0.07330
## 376          0.2280          0.07028
## 377          0.2722          0.06956
## 378          0.2819          0.11180
## 379          0.2758          0.06386
## 380          0.2664          0.07809
## 381          0.2513          0.06911
## 382          0.2227          0.06777
## 383          0.3020          0.06846
## 384          0.4270          0.12330
## 385          0.3060          0.06783
## 386          0.2691          0.09479
## 387          0.2833          0.08858
## 388          0.2213          0.07842
## 389          0.2651          0.07397
## 390          0.2300          0.07230
## 391          0.2972          0.09075
## 392          0.1566          0.05905
## 393          0.2346          0.08025
## 394          0.3258          0.09720
## 395          0.2806          0.07782
## 396          0.2542          0.06623
## 397          0.2787          0.07427
## 398          0.2556          0.06828
## 399          0.4045          0.07918
## 400          0.1934          0.08988
## 401          0.2502          0.09209
## 402          0.2048          0.07628
## 403          0.3672          0.11230
## 404          0.2689          0.07055
## 405          0.2845          0.12490
## 406          0.2609          0.06735
## 407          0.3153          0.08960
## 408          0.3016          0.08523
## 409          0.3585          0.10650
## 410          0.2757          0.08178
## 411          0.2639          0.11780
## 412          0.2849          0.07087
## 413          0.2300          0.06769
## 414          0.1712          0.07343
## 415          0.3101          0.06688
```

```
## 416         0.3266         0.09009
## 417         0.2676         0.06765
## 418         0.3053         0.08764
## 419         0.3271         0.07632
## 420         0.5774         0.10300
## 421         0.3108         0.12590
## 422         0.2675         0.07873
## 423         0.2859         0.06772
## 424         0.3038         0.12520
## 425         0.1811         0.07427
## 426         0.3383         0.10310
## 427         0.3124         0.07590
## 428         0.2525         0.06827
## 429         0.2262         0.06742
## 430         0.3258         0.11910
## 431         0.3470         0.07900
## 432         0.3074         0.07863
## 433         0.3379         0.07924
## 434         0.2510         0.09445
## 435         0.2540         0.09532
## 436         0.2100         0.07083
## 437         0.2567         0.05737
## 438         0.3024         0.06949
## 439         0.3220         0.09026
## 440         0.3168         0.07987
## 441         0.3596         0.09166
## 442         0.2642         0.06953
## 443         0.2834         0.08234
## 444         0.3227         0.09326
## 445         0.2853         0.08496
## 446         0.2450         0.07773
## 447         0.2663         0.06321
## 448         0.2171         0.07037
## 449         0.3397         0.08365
## 450         0.3010         0.09060
## 451         0.2615         0.08269
## 452         0.3215         0.12050
## 453         0.2576         0.07602
## 454         0.2305         0.09952
## 455         0.3075         0.07351
## 456         0.2691         0.07683
## 457         0.2710         0.07191
## 458         0.2868         0.08218
## 459         0.2592         0.07848
## 460         0.2295         0.05843
## 461         0.2641         0.07427
## 462         0.3007         0.08314
## 463         0.3202         0.07287
## 464         0.1859         0.06810
## 465         0.4066         0.10590
## 466         0.2556         0.09359
## 467         0.2651         0.08385
## 468         0.2842         0.08225
## 469         0.2608         0.09702
## 470         0.2725         0.07234
## 471         0.2179         0.06871
## 472         0.2646         0.06085
## 473         0.1987         0.06169
## 474         0.2713         0.07568
## 475         0.2404         0.06639
## 476         0.2812         0.08198
## 477         0.2191         0.09349
## 478         0.2268         0.07425
## 479         0.2962         0.08472
## 480         0.3651         0.11830
## 481         0.2889         0.08006
## 482         0.2718         0.09353
## 483         0.3444         0.09782
## 484         0.2614         0.11620
## 485         0.2731         0.06825
## 486         0.4245         0.10500
## 487         0.3174         0.08524
## 488         0.4055         0.09789
```

```
## 489         0.2687         0.07429
## 490         0.4154         0.14030
## 491         0.3251         0.07625
## 492         0.4087         0.12400
## 493         0.3216         0.10100
## 494         0.2289         0.08278
## 495         0.2972         0.07712
## 496         0.2582         0.08893
## 497         0.2622         0.08490
## 498         0.3693         0.09618
## 499         0.2818         0.10050
## 500         0.3512         0.12040
## 501         0.4677         0.07623
## 502         0.2948         0.08452
## 503         0.3706         0.11420
## 504         0.2597         0.12000
## 505         0.2660         0.09270
## 506         0.2911         0.07307
## 507         0.2458         0.06120
## 508         0.2334         0.06142
## 509         0.2929         0.09873
## 510         0.3003         0.10480
## 511         0.3184         0.08183
## 512         0.2504         0.07948
## 513         0.4761         0.14020
## 514         0.2380         0.08718
## 515         0.4824         0.09614
## 516         0.3407         0.12430
## 517         0.2750         0.08902
## 518         0.3613         0.08758
## 519         0.3021         0.07987
## 520         0.4128         0.10760
## 521         0.3020         0.09646
## 522         0.3014         0.08750
## 523         0.3233         0.06165
## 524         0.2871         0.07039
## 525         0.2932         0.09382
## 526         0.3604         0.07062
## 527         0.2826         0.09585
## 528         0.4882         0.06111
## 529         0.3267         0.06994
## 530         0.3057         0.07875
## 531         0.2465         0.09981
## 532         0.2790         0.10660
## 533         0.2165         0.06025
## 534         0.3054         0.09519
## 535         0.3305         0.08465
## 536         0.3006         0.07802
## 537         0.3306         0.07036
## 538         0.3487         0.06958
## 539         0.2249         0.08492
## 540         0.2772         0.08756
## 541         0.3275         0.06469
## 542         0.3681         0.08982
## 543         0.2505         0.06431
## 544         0.5558         0.10240
## 545         0.5440         0.09964
## 546         0.3380         0.09584
## 547         0.1652         0.07722
## 548         0.2744         0.07238
## 549         0.2250         0.08321
## 550         0.2747         0.08301
## 551         0.2488         0.08151
## 552         0.2576         0.07018
## 553         0.4366         0.20750
## 554         0.2478         0.07757
## 555         0.2444         0.06788
## 556         0.3828         0.10070
## 557         0.2740         0.06487
## 558         0.2827         0.09208
## 559         0.1902         0.07313
## 560         0.3600         0.07285
## 561         0.3591         0.10140
```

```
## 561          0.3591          0.10140
## 562          0.2661          0.07961
## 563          0.2345          0.06464
## 564          0.2382          0.08553
## 565          0.2235          0.06925
## 566          0.2434          0.08488
## 567          0.3175          0.09772
## 568          0.2606          0.07810
## 569          0.2730          0.08666
```

```
#Here we use View func to get the excel style view of the data
#It is convenient to read the data
#View(wisc_bc_df)

#Here we are renaming the data set for our ease
cancer<-wisc_bc_df

#After installing the following 3 packages, we use library() to execute it
#We use ggplot2 for the graphs. It lets us add details to the graphs such as aes value and color etc
#corrplot is used for correlatiional matrix
#reshape is for change how the data looks. eg : you can change the matrix columns of your matrix
library("ggplot2")
```

```
## Warning: package 'ggplot2' was built under R version 3.5.2
```

```
library("corrplot")
```

```
## Warning: package 'corrplot' was built under R version 3.5.2
```

```
## corrplot 0.84 loaded
```

```
library("reshape")
```

```
## Warning: package 'reshape' was built under R version 3.5.2
```

```
#str() tells us the data type of data in each column
str(cancer)
```

```
## 'data.frame':    569 obs. of  32 variables:
##  $ id               : int  87139402 8910251 905520 868871 9012568 906539 925291 87880 862989 89827 ...
##  $ diagnosis        : Factor w/ 2 levels "B","M": 1 1 1 1 1 1 1 2 1 1 ...
##  $ radius_mean      : num  12.3 10.6 11 11.3 15.2 ...
##  $ texture_mean     : num  12.4 18.9 16.8 13.4 13.2 ...
##  $ perimeter_mean   : num  78.8 69.3 70.9 73 97.7 ...
##  $ area_mean        : num  464 346 373 385 712 ...
##  $ smoothness_mean  : num  0.1028 0.0969 0.1077 0.1164 0.0796 ...
##  $ compactness_mean : num  0.0698 0.1147 0.078 0.1136 0.0693 ...
##  $ concavity_mean   : num  0.0399 0.0639 0.0305 0.0464 0.0339 ...
##  $ points_mean      : num  0.037 0.0264 0.0248 0.048 0.0266 ...
##  $ symmetry_mean    : num  0.196 0.192 0.171 0.177 0.172 ...
##  $ dimension_mean   : num  0.0595 0.0649 0.0634 0.0607 0.0554 ...
##  $ radius_se        : num  0.236 0.451 0.197 0.338 0.178 ...
##  $ texture_se       : num  0.666 1.197 1.387 1.343 0.412 ...
##  $ perimeter_se     : num  1.67 3.43 1.34 1.85 1.34 ...
##  $ area_se          : num  17.4 27.1 13.5 26.3 17.7 ...
##  $ smoothness_se    : num  0.00805 0.00747 0.00516 0.01127 0.00501 ...
##  $ compactness_se   : num  0.0118 0.03581 0.00936 0.03498 0.01485 ...
##  $ concavity_se     : num  0.0168 0.0335 0.0106 0.0219 0.0155 ...
##  $ points_se        : num  0.01241 0.01365 0.00748 0.01965 0.00915 ...
##  $ symmetry_se      : num  0.0192 0.035 0.0172 0.0158 0.0165 ...
##  $ dimension_se     : num  0.00225 0.00332 0.0022 0.00344 0.00177 ...
##  $ radius_worst     : num  13.5 11.9 12.4 11.9 16.2 ...
##  $ texture_worst    : num  15.6 22.9 26.4 15.8 15.7 ...
##  $ perimeter_worst  : num  87 78.3 79.9 76.5 104.5 ...
##  $ area_worst       : num  549 425 471 434 819 ...
##  $ smoothness_worst : num  0.139 0.121 0.137 0.137 0.113 ...
##  $ compactness_worst: num  0.127 0.252 0.148 0.182 0.174 ...
##  $ concavity_worst  : num  0.1242 0.1916 0.1067 0.0867 0.1362 ...
##  $ points_worst     : num  0.0939 0.0793 0.0743 0.0861 0.0818 ...
##  $ symmetry_worst   : num  0.283 0.294 0.3 0.21 0.249 ...
##  $ dimension_worst  : num  0.0677 0.0759 0.0788 0.0678 0.0677 ...
```

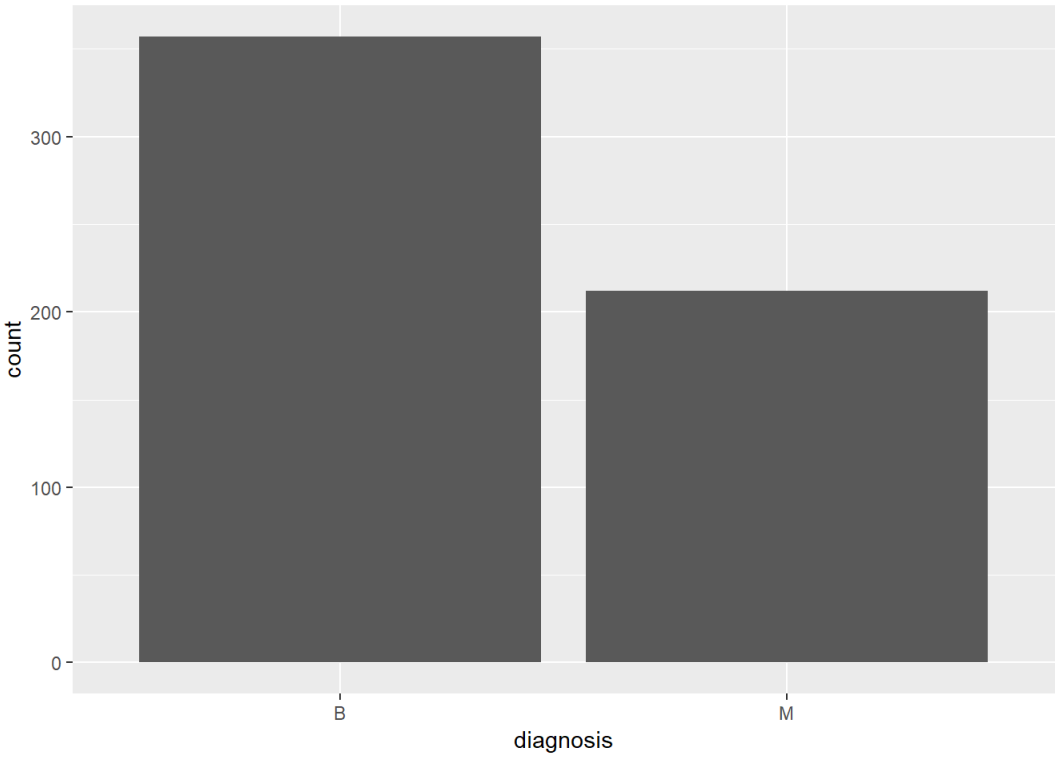
```
#displays the summary of the dataset
summary(cancer)
```

```
##        id            diagnosis  radius_mean      texture_mean
##  Min.   :     8670   B:357     Min.   : 6.981   Min.   : 9.71
##  1st Qu.:   869218   M:212     1st Qu.:11.700   1st Qu.:16.17
##  Median :   906024             Median :13.370   Median :18.84
##  Mean   : 30371831             Mean   :14.127   Mean   :19.29
##  3rd Qu.:  8813129             3rd Qu.:15.780   3rd Qu.:21.80
##  Max.   :911320502             Max.   :28.110   Max.   :39.28
##  perimeter_mean     area_mean      smoothness_mean   compactness_mean
##  Min.   : 43.79   Min.   : 143.5   Min.   :0.05263   Min.   :0.01938
##  1st Qu.: 75.17   1st Qu.: 420.3   1st Qu.:0.08637   1st Qu.:0.06492
##  Median : 86.24   Median : 551.1   Median :0.09587   Median :0.09263
##  Mean   : 91.97   Mean   : 654.9   Mean   :0.09636   Mean   :0.10434
##  3rd Qu.:104.10   3rd Qu.: 782.7   3rd Qu.:0.10530   3rd Qu.:0.13040
##  Max.   :188.50   Max.   :2501.0   Max.   :0.16340   Max.   :0.34540
##  concavity_mean     points_mean      symmetry_mean    dimension_mean
##  Min.   :0.00000   Min.   :0.00000   Min.   :0.1060   Min.   :0.04996
##  1st Qu.:0.02956   1st Qu.:0.02031   1st Qu.:0.1619   1st Qu.:0.05770
##  Median :0.06154   Median :0.03350   Median :0.1792   Median :0.06154
##  Mean   :0.08880   Mean   :0.04892   Mean   :0.1812   Mean   :0.06280
##  3rd Qu.:0.13070   3rd Qu.:0.07400   3rd Qu.:0.1957   3rd Qu.:0.06612
##  Max.   :0.42680   Max.   :0.20120   Max.   :0.3040   Max.   :0.09744
##    radius_se        texture_se      perimeter_se       area_se
##  Min.   :0.1115   Min.   :0.3602   Min.   : 0.757   Min.   :  6.802
##  1st Qu.:0.2324   1st Qu.:0.8339   1st Qu.: 1.606   1st Qu.: 17.850
##  Median :0.3242   Median :1.1080   Median : 2.287   Median : 24.530
##  Mean   :0.4052   Mean   :1.2169   Mean   : 2.866   Mean   : 40.337
##  3rd Qu.:0.4789   3rd Qu.:1.4740   3rd Qu.: 3.357   3rd Qu.: 45.190
##  Max.   :2.8730   Max.   :4.8850   Max.   :21.980   Max.   :542.200
##  smoothness_se      compactness_se      concavity_se
##  Min.   :0.001713   Min.   :0.002252   Min.   :0.00000
##  1st Qu.:0.005169   1st Qu.:0.013080   1st Qu.:0.01509
##  Median :0.006380   Median :0.020450   Median :0.02589
##  Mean   :0.007041   Mean   :0.025478   Mean   :0.03189
##  3rd Qu.:0.008146   3rd Qu.:0.032450   3rd Qu.:0.04205
##  Max.   :0.031130   Max.   :0.135400   Max.   :0.39600
##    points_se         symmetry_se        dimension_se        radius_worst
##  Min.   :0.000000   Min.   :0.007882   Min.   :0.0008948   Min.   : 7.93
##  1st Qu.:0.007638   1st Qu.:0.015160   1st Qu.:0.0022480   1st Qu.:13.01
##  Median :0.010930   Median :0.018730   Median :0.0031870   Median :14.97
##  Mean   :0.011796   Mean   :0.020542   Mean   :0.0037949   Mean   :16.27
##  3rd Qu.:0.014710   3rd Qu.:0.023480   3rd Qu.:0.0045580   3rd Qu.:18.79
##  Max.   :0.052790   Max.   :0.078950   Max.   :0.0298400   Max.   :36.04
##  texture_worst   perimeter_worst    area_worst     smoothness_worst
##  Min.   :12.02   Min.   : 50.41   Min.   : 185.2   Min.   :0.07117
##  1st Qu.:21.08   1st Qu.: 84.11   1st Qu.: 515.3   1st Qu.:0.11660
##  Median :25.41   Median : 97.66   Median : 686.5   Median :0.13130
##  Mean   :25.68   Mean   :107.26   Mean   : 880.6   Mean   :0.13237
##  3rd Qu.:29.72   3rd Qu.:125.40   3rd Qu.:1084.0   3rd Qu.:0.14600
##  Max.   :49.54   Max.   :251.20   Max.   :4254.0   Max.   :0.22260
##  compactness_worst concavity_worst   points_worst     symmetry_worst
##  Min.   :0.02729   Min.   :0.0000   Min.   :0.00000   Min.   :0.1565
##  1st Qu.:0.14720   1st Qu.:0.1145   1st Qu.:0.06493   1st Qu.:0.2504
##  Median :0.21190   Median :0.2267   Median :0.09993   Median :0.2822
##  Mean   :0.25427   Mean   :0.2722   Mean   :0.11461   Mean   :0.2901
##  3rd Qu.:0.33910   3rd Qu.:0.3829   3rd Qu.:0.16140   3rd Qu.:0.3179
##  Max.   :1.05800   Max.   :1.2520   Max.   :0.29100   Max.   :0.6638
##  dimension_worst
##  Min.   :0.05504
##  1st Qu.:0.07146
##  Median :0.08004
##  Mean   :0.08395
##  3rd Qu.:0.09208
##  Max.   :0.20750
```

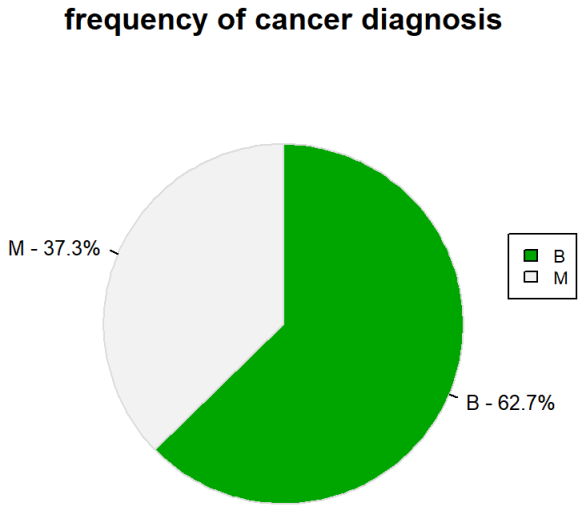
```
#Gives you frequency table
#creating a data frame for categorizing benign & malignant
diagnosis.table <- table(cancer$diagnosis)
#shows the frequency of number of ids diagnosed with B or M
diagnosis.table
```

```
##
##   B   M
## 357 212
```

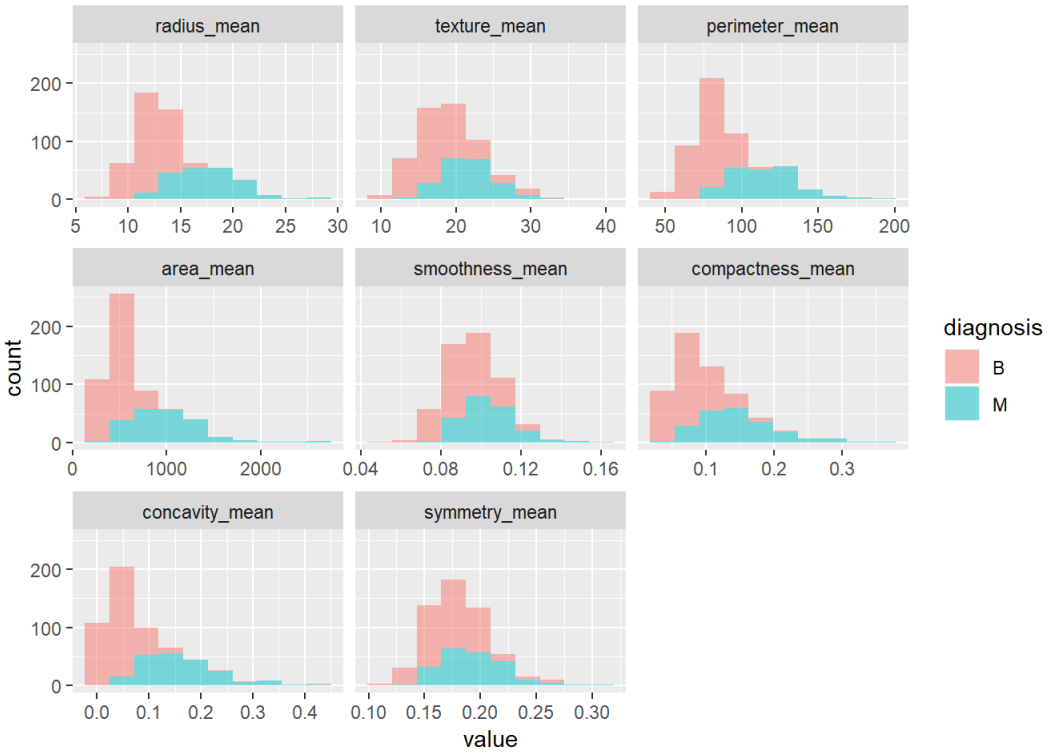
```
#Bar Plot
#Plotting the frequency of the 2 categories in a bar plot
ggplot(data=cancer, aes(x=diagnosis)) + geom_bar(stat = "count")
```



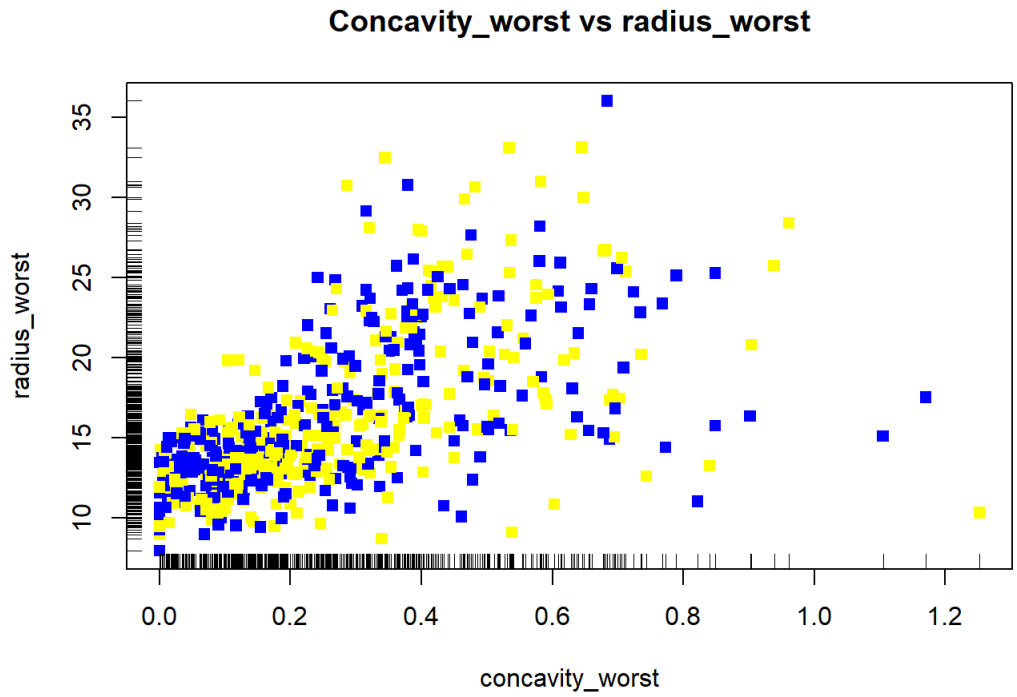

```
#Pie chart represented in frequency in terms of %
diagnosis.prop.table <- prop.table(diagnosis.table)*100
diagnosis.prop.df <- as.data.frame(diagnosis.prop.table)

#Here we labeling the 2 categories of the pie chart
pielabels <- sprintf("%s - %3.1f%s", diagnosis.prop.df[,1], diagnosis.prop.table, "%")

#using colors to show distinction
colors <- terrain.colors(2)
pie(diagnosis.prop.table,
    labels=pielabels,
    clockwise=TRUE,
    col=colors,
    border="gainsboro",
    radius=0.8,
    cex=0.8,
    main="frequency of cancer diagnosis")
legend(1, .4, legend=diagnosis.prop.df[,1], cex = 0.7, fill = colors)
```



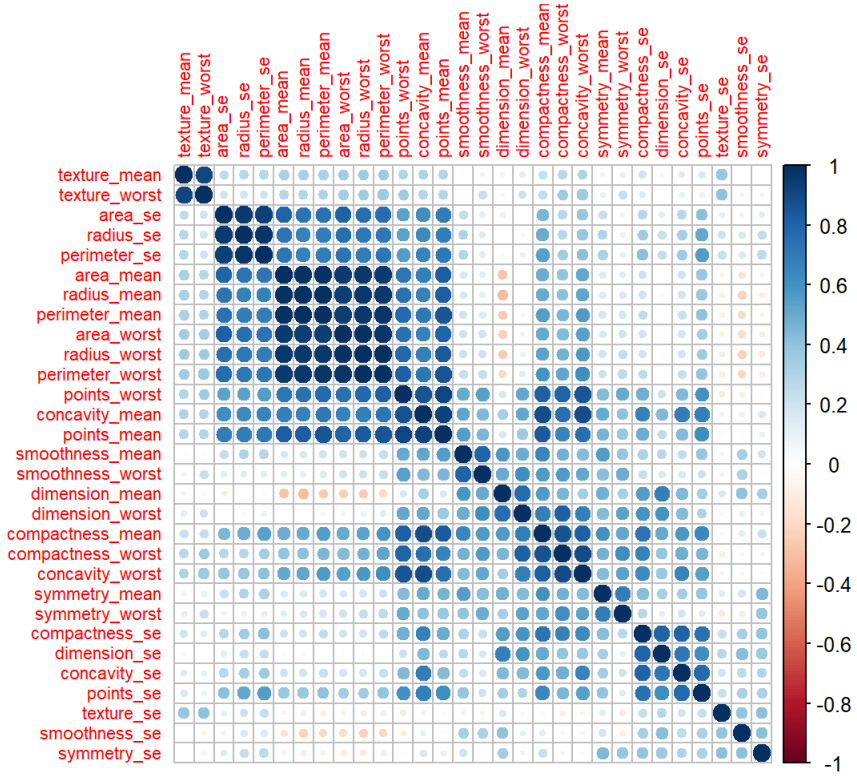

```
#Plot histograms of "mean" variables group by diagnosis
data_mean <- cancer[ ,c("diagnosis", "radius_mean", "texture_mean","perimeter_mean", "area_mean", "smoothnes
s_mean", "compactness_mean", "concavity_mean", "symmetry_mean" )]

#Plot histograms for comparison
ggplot(data = melt(data_mean, id.var = "diagnosis"), mapping = aes(x = value)) +
  geom_histogram(bins = 10, aes(fill=diagnosis), alpha=0.5) + facet_wrap(~variable, scales ='free_x')
```



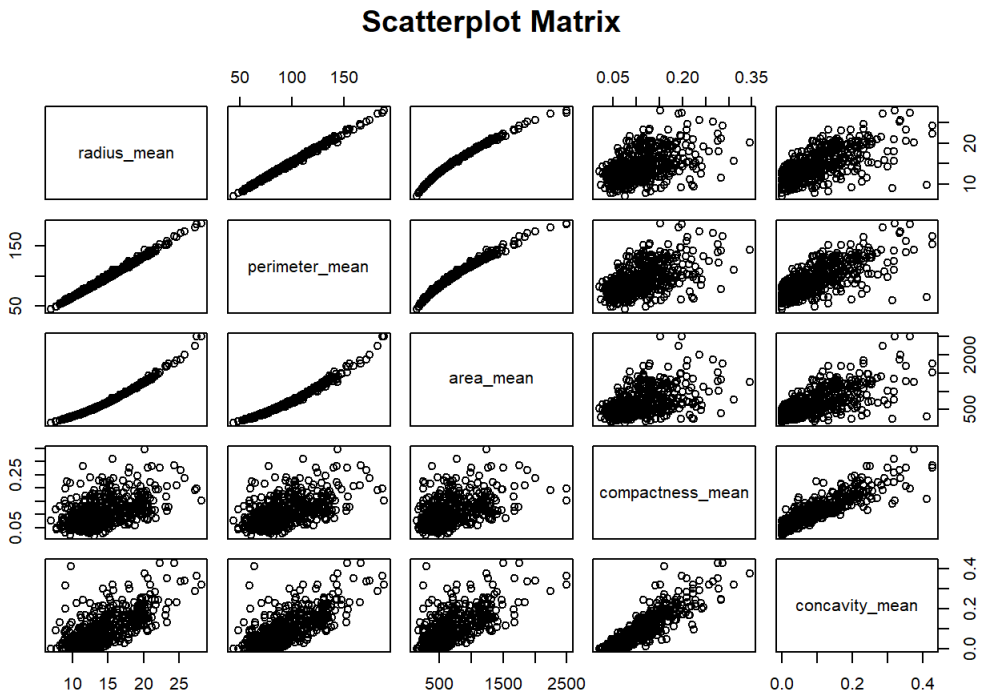
```
#Scatter plot of two varaible (concavity against radius)
a <-cancer[,c('concavity_worst','radius_worst')]
plot(x = cancer$concavity_worst,y = cancer$radius_worst,
     xlab = "concavity_worst",
     ylab = "radius_worst",
     main = "Concavity_worst vs radius_worst",
     pch=15,col=c("blue","yellow"))
rug(cancer$concavity_worst, side = 1)

rug(cancer$radius_worst, side = 2)
```




```
#Correlation Matrix of columns
corMatMy <- cor(cancer[,3:32])
corrplot(corMatMy, order = "hclust", tl.cex = 0.7)
```



```
#Scatterplot Matrix
pairs(~radius_mean+perimeter_mean+area_mean+compactness_mean+concavity_mean,data = cancer,main = "Scatterplo
t Matrix")
```




```
names(cancer)
```

```
##  [1] "id"                "diagnosis"         "radius_mean"
##  [4] "texture_mean"      "perimeter_mean"    "area_mean"
##  [7] "smoothness_mean"   "compactness_mean"  "concavity_mean"
## [10] "points_mean"       "symmetry_mean"     "dimension_mean"
## [13] "radius_se"         "texture_se"        "perimeter_se"
## [16] "area_se"           "smoothness_se"     "compactness_se"
## [19] "concavity_se"      "points_se"         "symmetry_se"
## [22] "dimension_se"      "radius_worst"      "texture_worst"
## [25] "perimeter_worst"   "area_worst"        "smoothness_worst"
## [28] "compactness_worst" "concavity_worst"   "points_worst"
## [31] "symmetry_worst"    "dimension_worst"
```

```
#Multivariate analysis
#T TEST
with(data=cancer,t.test(radius_mean[diagnosis=="B"],radius_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  radius_mean[diagnosis == "B"] and radius_mean[diagnosis == "M"]
## t = -25.436, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -5.726832 -4.905781
## sample estimates:
## mean of x mean of y
##  12.14652  17.46283
```

```
with(data=cancer,t.test(texture_mean[diagnosis=="B"],texture_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  texture_mean[diagnosis == "B"] and texture_mean[diagnosis == "M"]
## t = -10.867, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -4.357107 -3.023181
## sample estimates:
## mean of x mean of y
##  17.91476  21.60491
```

```
with(data=cancer,t.test(perimeter_mean[diagnosis=="B"],perimeter_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  perimeter_mean[diagnosis == "B"] and perimeter_mean[diagnosis == "M"]
## t = -26.405, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -40.06379 -34.51615
## sample estimates:
## mean of x mean of y
##  78.07541 115.36538
```

```
with(data=cancer,t.test(area_mean[diagnosis=="B"],area_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  area_mean[diagnosis == "B"] and area_mean[diagnosis == "M"]
## t = -23.939, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -557.8898 -473.2826
## sample estimates:
## mean of x mean of y
##  462.7902  978.3764
```

```
with(data=cancer,t.test(smoothness_mean[diagnosis=="B"],smoothness_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  smoothness_mean[diagnosis == "B"] and smoothness_mean[diagnosis == "M"]
## t = -9.1461, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.012658756 -0.008182931
## sample estimates:
##  mean of x  mean of y
## 0.09247765 0.10289849
```

```
with(data=cancer,t.test(compactness_mean[diagnosis=="B"],compactness_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  compactness_mean[diagnosis == "B"] and compactness_mean[diagnosis == "M"]
## t = -17.698, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.07232827 -0.05787805
## sample estimates:
##  mean of x  mean of y
## 0.08008462 0.14518778
```

```
with(data=cancer,t.test(concavity_mean[diagnosis=="B"],concavity_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  concavity_mean[diagnosis == "B"] and concavity_mean[diagnosis == "M"]
## t = -23.104, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1244696 -0.1049646
## sample estimates:
##  mean of x  mean of y
## 0.04605762 0.16077472
```

```
with(data=cancer,t.test(points_mean[diagnosis=="B"],points_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  points_mean[diagnosis == "B"] and points_mean[diagnosis == "M"]
## t = -29.354, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.06643938 -0.05810581
## sample estimates:
##  mean of x  mean of y
## 0.02571741 0.08799000
```

```
with(data=cancer,t.test(symmetry_mean[diagnosis=="B"],symmetry_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  symmetry_mean[diagnosis == "B"] and symmetry_mean[diagnosis == "M"]
## t = -8.3383, df = 567, p-value = 5.733e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.02313331 -0.01431262
## sample estimates:
## mean of x mean of y
##  0.174186  0.192909
```

```
with(data=cancer,t.test(dimension_mean[diagnosis=="B"],dimension_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  dimension_mean[diagnosis == "B"] and dimension_mean[diagnosis == "M"]
## t = 0.30571, df = 567, p-value = 0.7599
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.001016083  0.001390684
## sample estimates:
##  mean of x  mean of y
## 0.06286739 0.06268009
```

```
#Hotelling T2 test
#install.packages("Hotelling")
library(Hotelling)
```

```
## Warning: package 'Hotelling' was built under R version 3.5.2
```

```
## Loading required package: corpcor
```

```
## Warning: package 'corpcor' was built under R version 3.5.2
```

```
t2testcan <- hotelling.test(radius_mean + texture_mean + perimeter_mean + area_mean + smoothness_mean + comp
actness_mean + concavity_mean + points_mean + symmetry_mean + dimension_mean ~ diagnosis, data=cancer)
# Output of the function hotelling.test is given
cat("T2 statistic =",t2testcan$stat[[1]],"\n")
```

```
## T2 statistic = 1220.313
```

```
#print(t2testcan)
#  T2 statistic is located in the first element of the list "stat"
#View(t2testcan)



## Levene's tests based on absolute differences around means using t-tests. Standarizing the sparrows data s
et with scale()
matstand <- scale(cancer[,3:10])
matstand
```

```
##         radius_mean  texture_mean perimeter_mean    area_mean
##   [1,] -0.512845261 -1.604183e+00    -0.53990056 -0.542146756
##   [2,] -1.000920224 -7.896900e-02    -0.93374423 -0.876603348
##   [3,] -0.876063838 -5.718735e-01    -0.86625169 -0.800448406
##   [4,] -0.807960355 -1.371681e+00    -0.78065139 -0.767485819
##   [5,]  0.301558892 -1.413531e+00     0.23379444  0.161718134
##   [6,] -0.725668646 -5.804381e-02    -0.73126661 -0.696729922
##   [7,] -0.742694517  1.078892e+00    -0.71809733 -0.714347856
##   [8,] -0.090036136  1.037041e+00    -0.01683336 -0.162224529
##   [9,] -1.032134320  8.172307e-05    -1.01070219 -0.905871851
##  [10,] -0.870388548 -1.006653e+00    -0.84279392 -0.798459284
##  [11,]  1.833887264  4.534609e-01     1.88612710  1.889980655
##  [12,] -0.532708777 -3.137962e-01    -0.56376987 -0.552944845
##  [13,] -0.280158360  3.372098e-01    -0.24647261 -0.335278109
##  [14,] -0.305697166  4.731766e-03    -0.38516156 -0.362841651
##  [15,]  1.550122751  1.327669e+00     1.47047181  1.523413958
##  [16,]  0.131300184  7.882640e-01     0.18194041  0.006282488
##  [17,]  0.449116439 -1.246130e+00     0.41281429  0.303514089
##  [18,] -0.413527681 -4.625975e-01    -0.44113098 -0.468833417
##  [19,]  1.692005007  1.062616e+00     1.75854973  1.682543687
##  [20,] -0.549734648 -1.394931e+00    -0.53043514 -0.565732056
##  [21,] -0.685941614 -4.881728e-01    -0.71151269 -0.666608937
##  [22,] -0.691616904  1.197468e+00    -0.64196245 -0.706107209
##  [23,] -0.904440289 -1.626698e-01    -0.88806330 -0.809541533
##  [24,]  0.276020086 -6.741745e-01     0.31322164  0.055726368
##  [25,] -1.026459030  2.093336e-01    -0.96008279 -0.911270896
##  [26,] -0.092873781 -8.136758e-01    -0.06333736 -0.201154480
```

```
##  [27,] -0.192191361 -2.300954e-01    -0.22095714 -0.283560947
##  [28,]  0.332772989  1.390444e+00     0.42927589  0.220255141
##  [29,] -1.282982150 -5.695485e-01    -1.24816071 -1.063864939
##  [30,] -0.206379587 -5.439733e-01    -0.26704961 -0.291233273
##  [31,] -0.305697166 -1.267055e+00    -0.38104616 -0.353180203
##  [32,] -0.385151230  7.394385e-01    -0.42178861 -0.422231139
##  [33,]  0.985431369  9.393903e-01     1.11243210  0.925256673
##  [34,] -0.527033487 -3.184462e-01    -0.55800831 -0.536463552
##  [35,]  0.128462539 -1.308905e+00     0.09551703  0.011113212
##  [36,] -0.132600813 -9.624771e-01    -0.15222998 -0.211100088
##  [37,]  1.365675817  4.697360e-01     1.30174045  1.350076217
##  [38,] -0.632026357 -1.078728e+00    -0.57035451 -0.631088909
##  [39,]  0.752744468 -1.138443e-01     0.71323841  0.657577736
##  [40,]  0.599511631 -1.208194e-01     0.69266142  0.426839629
##  [41,]  1.754433200  1.806623e+00     1.68447255  1.799049381
##  [42,]  1.550122751 -2.649707e-01     1.59393378  1.588770811
##  [43,] -0.768233323  2.535091e-01    -0.59216612 -0.763791736
##  [44,] -0.322723037 -1.176379e+00    -0.32466519 -0.399498321
##  [45,] -0.064497330 -6.206990e-01    -0.12342219 -0.157677965
##  [46,]  1.121638336  5.929622e-01     1.04658572  1.048866373
##  [47,] -0.850525032 -6.206990e-01    -0.88477099 -0.777999748
##  [48,]  3.292436862 -4.253972e-01     3.38413230  3.850686244
##  [49,] -0.175165490 -9.291913e-02    -0.15922616 -0.275036140
##  [50,] -0.473118229  1.395830e-01    -0.47487725 -0.521687220
##  [51,] -0.075847910 -5.486233e-01    -0.04152575 -0.215930812
##  [52,]  0.247643635 -8.787763e-01     0.22556364  0.084142391
##  [53,] -0.660402808 -4.718976e-01    -0.68764338 -0.633646351
##  [54,]  0.026307314  1.990300e+00     0.02390909 -0.088058708
##  [55,]  2.600051450  1.715947e+00     2.75447627  2.927165495
##  [56,] -0.223405457 -7.974006e-01    -0.22548408 -0.383301188
##  [57,] -0.677428679 -1.069428e+00    -0.64443169 -0.650411804
##  [58,] -1.148477771 -9.717772e-01    -1.16091425 -0.958725654
##  [59,]  2.872465383  2.116587e-01     3.05490039  3.143127271
##  [60,]  1.496207493 -2.579956e-01     1.44989481  1.392700252
##  [61,]  1.402565204  1.283494e+00     1.49516420  1.276194557
##  [62,]  0.948541983  1.253268e+00     0.99308554  0.936907242
##  [63,]  0.934353757  1.457870e+00     0.92723915  0.832904598
##  [64,] -0.195029006  5.325116e-01    -0.23824182 -0.261112289
##  [65,]  0.344123569 -1.169404e+00     0.43339128  0.140690277
##  [66,] -0.507169971  6.813130e-01    -0.49874657 -0.541010116
##  [67,] -0.243268973 -5.276981e-01    -0.30532282 -0.308282887
##  [68,]  0.136975474 -8.369260e-01     0.02925911  0.028446986
##  [69,] -0.078685556 -9.555021e-01    -0.12259911 -0.191777192
##  [70,] -0.697292195  1.698083e-01    -0.68970108 -0.678259507
##  [71,] -0.183678426  3.558100e-01    -0.14687996 -0.271910377
##  [72,] -1.156990706 -4.091220e-01    -1.13416416 -0.977764390
##  [73,] -1.443025336 -9.059411e-02    -1.31277247 -1.166162622
##  [74,]  1.056372498 -1.408881e+00     0.93135455  0.958219260
##  [75,]  0.769770339  3.960709e-02     0.67619982  0.640243962
##  [76,] -0.501494680  5.836621e-01    -0.50162735 -0.536463552
##  [77,]  1.186904174 -1.649948e-01     1.09597051  1.097173612
##  [78,] -0.799447419 -5.804381e-02    -0.83003618 -0.741058918
##  [79,] -0.387988875 -1.376331e+00    -0.39833083 -0.428482664
##  [80,]  1.096099529  3.186096e-01     1.06304732  0.957082619
##  [81,]  0.239130699 -5.439733e-01     0.17494423  0.088120634
##  [82,] -0.518520551 -7.881005e-01    -0.54072364 -0.543283397
##  [83,] -0.234756038  5.301866e-01    -0.27692657 -0.309135368
##  [84,]  0.145488410 -9.415519e-01     0.15642494 -0.008493844
##  [85,] -0.810798000 -1.471657e+00    -0.77406675 -0.763223416
##  [86,] -0.351099488 -1.434456e+00    -0.41479243 -0.394951757
##  [87,] -0.507169971 -1.632083e+00    -0.53619670 -0.529643706
##  [88,] -0.212054877  2.657581e+00    -0.23165718 -0.277593582
##  [89,]  1.995633037  8.719647e-01     1.86143471  2.128675248
##  [90,] -0.118412587 -1.417446e-01    -0.13329914 -0.238379470
##  [91,] -0.373800649 -1.448407e+00    -0.43948482 -0.415127134
##  [92,] -0.470280584 -4.602725e-01    -0.47405417 -0.496681120
##  [93,]  0.420739988  2.100692e-02     0.33050631  0.294705122
##  [94,] -0.319885392  1.357894e+00    -0.38516156 -0.382732867
##  [95,]  0.026307314  8.905649e-01     0.09880935 -0.127841141
##  [96,]  0.539921083 -8.787763e-01     0.56919945  0.393024562
##  [97,] -0.331235972 -2.324204e-01    -0.32054980 -0.368524856
##  [98,] -0.646214582 -4.253972e-01    -0.67612026 -0.631373069
##  [99,] -1.120101319 -4.091220e-01    -1.10494483 -0.971228704
```

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##  [99,] -1.120101319 -4.091220e-01    -1.10494485 -0.971228704
## [100,]  3.147716961  1.306744e+00     3.27301653  3.475594740
## [101,] -0.969706127  2.558341e-01    -0.92469035 -0.880865751
## [102,] -1.250632996 -2.486956e-01    -1.28561084 -1.042268762
## [103,] -0.805122710 -1.453057e+00    -0.81233996 -0.758392692
## [104,]  0.156838990  1.953835e-01     0.11403633  0.084142391
## [105,] -0.263132489 -4.323722e-01    -0.32260749 -0.321922578
## [106,] -0.748369807 -1.092678e+00    -0.73990894 -0.710369613
## [107,] -0.444741778 -5.106875e-02    -0.41355781 -0.480483986
## [108,] -0.541221712  1.744583e-01    -0.51438508 -0.573404382
## [109,] -0.938492031  1.143992e+00    -0.94979429 -0.833410993
## [110,] -0.842012096  4.929862e-01    -0.86501707 -0.780273029
## [111,] -0.705805130 -2.231203e-01    -0.69134724 -0.688773435
## [112,] -1.676563530  3.279097e-01    -1.59261960 -1.281531676
## [113,]  1.286221753 -5.044479e-01     1.21120168  1.199471295
## [114,] -0.112737297  7.719888e-01     0.06712078 -0.217635773
## [115,] -0.671753388  5.371617e-01    -0.70986653 -0.645012760
## [116,]  0.891789080  1.425320e+00     0.84081578  0.778345834
## [117,]  0.091573152  2.163087e-01     0.10374783 -0.034636585
## [118,]  0.386688246  1.581832e-01     0.42927589  0.255206850
## [119,]  1.609713298  5.278616e-01     1.55277979  1.634236448
## [120,] -0.305697166 -1.626698e-01    -0.28309967 -0.406034006
## [121,] -0.078685556 -4.835227e-01    -0.14523380 -0.188083109
## [122,]  1.831049619  6.627128e-01     1.75854973  1.804732586
## [123,] -0.717155711  1.209093e+00    -0.73003199 -0.675417904
## [124,]  2.151703519 -4.742226e-01     2.01370446  2.532182775
## [125,] -0.754045097 -7.578752e-01    -0.77982831 -0.716621138
## [126,] -0.756882742 -2.626457e-01    -0.75637054 -0.715484497
## [127,] -0.288671295 -8.671512e-01    -0.19585321 -0.354316844
## [128,]  0.134137829  9.300903e-01     0.08234776  0.027878666
## [129,]  1.382701688 -8.826909e-02     1.29350966  1.372809036
## [130,]  0.040495540  7.580387e-01     0.07411696 -0.071293255
## [131,]  0.219267183  7.533886e-01     0.41692969  0.085563192
## [132,] -0.132600813 -3.711862e-02    -0.10325673 -0.226160580
## [133,] -0.260294844  2.039125e+00    -0.29174200 -0.331015705
## [134,]  2.109138842  7.208383e-01     2.05897385  2.341795421
## [135,] -0.870388548 -5.044479e-01    -0.85267087 -0.819487141
## [136,]  0.715855082  4.860112e-01     0.74204620  0.709579058
## [137,] -1.530424806 -5.695485e-01    -1.51031162 -1.195146966
## [138,] -0.586624034 -1.522807e+00    -0.62262007 -0.586191592
## [139,]  0.832198532  3.976604e-01     0.81612338  0.749361490
## [140,] -0.620675776 -2.440455e-01    -0.66912408 -0.617449218
## [141,]  1.272033528  2.232838e-01     1.24000947  1.247778534
## [142,]  1.096099529 -2.071512e+00     1.26881726  0.983509520
## [143,]  1.703355588  2.083301e+00     1.61451077  1.722326119
## [144,]  0.034820250  6.650378e-01     0.18317503 -0.026111778
## [145,]  0.128462539  5.208865e-01     0.22391748 -0.028669220
## [146,] -0.657565163 -4.416723e-01    -0.68723184 -0.642171158
## [147,]  0.468979955 -3.254213e-01     0.47866067  0.358357013
## [148,]  0.673290405 -2.324204e-01     0.60212264  0.520612505
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## [152,] -1.244390176 -3.944364e-02    -1.23622605 -1.037722198
## [153,] -0.348261843 -7.834505e-01    -0.33865755 -0.405465686
## [154,] -1.080374288 -6.834746e-01    -1.09712557 -0.937697797
## [155,]  0.080222572  1.023827e-01     0.16712498 -0.011051286
## [156,] -1.331222117 -2.254453e-01    -1.32306097 -1.069263984
## [157,] -0.152464329 -3.370464e-01    -0.23577258 -0.234685387
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## [159,] -1.009433159 -2.254453e-01    -1.03498305 -0.892232160
## [160,] -0.180840780  6.999132e-01    -0.20819940 -0.266795493
## [161,] -0.243268973 -1.053153e+00    -0.29750356 -0.293222395
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## [163,] -0.073010265 -7.160249e-01    -0.14194148 -0.173875098
## [164,] -1.454943445 -1.136854e+00    -1.46545377 -1.161047738
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## [166,]  3.715245987  5.999372e-01     3.70924881  4.532670797
## [167,]  0.060359056 -1.353081e+00     0.02226293 -0.038898989
## [168,]  0.897464370  6.603878e-01     0.92312375  0.832336278
## [169,] -0.277320715 -9.183017e-01    -0.27404579 -0.329594904
## [170,] -0.109899652 -3.207712e-01    -0.15840308 -0.198597038
## [171,] -0.271645425 -1.463946e-01    -0.24647261 -0.341813794
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## [172,] -0.041796169  7.680743e-02    -0.03494111 -0.157393805
## [173,] -0.118412587  3.581350e-01    -0.07280278 -0.218772414
## [174,] -0.152464329  5.929622e-01    -0.19791091 -0.266795493
## [175,] -0.197866651  7.913245e-02    -0.25223417 -0.254292443
## [176,] -0.359612424 -2.998460e-01    -0.36129224 -0.422231139
## [177,]  1.442292236 -1.673198e-01     1.37993303  1.412591468
## [178,] -0.870388548 -1.036878e+00    -0.89135562 -0.786240394
## [179,]  1.283384108 -3.928469e-01     1.30585585  1.196629693
## [180,] -0.552572293  2.860593e-01    -0.60698156 -0.557491409
## [181,] -0.538384067  6.285730e-02    -0.55265829 -0.550955724
## [182,]  0.551271664  8.378249e-02     0.49923767  0.462643818
## [183,] -0.101386717 -1.399581e+00    -0.16087232 -0.205132723
## [184,]  0.281695376 -6.067489e-01     0.28029845  0.175357825
## [185,] -0.824986226  1.326079e-01    -0.82427462 -0.760381813
## [186,] -0.912953225 -1.613483e+00    -0.93950579 -0.827443628
## [187,]  0.829360887 -4.874373e-02     0.88196977  0.682299676
## [188,]  1.226631206  6.092373e-01     1.16181689  1.193788091
## [189,]  1.711868523  8.610751e-02     1.61039537  1.759266949
## [190,] -1.244390176 -8.415760e-01    -1.25392227 -1.037153878
## [191,]  0.562622244 -2.882209e-01     0.54039166  0.449288287
## [192,] -0.623513421 -1.948286e+00    -0.65142787 -0.602957046
## [193,]  0.224942474 -1.013628e+00     0.18440965  0.090962237
## [194,]  0.117111959  1.918224e+00     0.19593277  0.011113212
## [195,]  0.446278794  2.372339e-01     0.37989110  0.317437940
## [196,]  1.411078139  1.627597e+00     1.52808739  1.355759422
## [197,]  0.270344796  1.499720e+00     0.24819833  0.175357825
## [198,]  0.139813120  1.099817e+00     0.10704015  0.022195461
## [199,] -0.189353716 -1.254694e-01    -0.18638779 -0.294927356
## [200,] -0.544059357 -1.208929e+00    -0.54278134 -0.548114121
## [201,]  0.244805990  1.374169e+00     0.14695952  0.124777304
## [202,] -0.944167321  6.255125e-01    -0.95390969 -0.838241716
## [203,]  0.244805990  6.557377e-01     0.22885596  0.110285132
## [204,] -0.424878262  3.418599e-01    -0.40409239 -0.495828639
## [205,] -0.685941614 -8.927265e-01    -0.69710880 -0.666608937
## [206,]  0.378175311  1.083542e+00     0.48689147  0.217129379
## [207,] -0.717155711 -2.161453e-01    -0.74443588 -0.688205115
## [208,] -0.671753388 -2.672957e-01    -0.69834341 -0.635919632
## [209,] -0.178003135 -1.529782e+00    -0.25840727 -0.252019161
## [210,]  1.975769521  1.692697e+00     2.08778165  1.864406234
## [211,] -0.351099488 -8.346009e-01    -0.32466519 -0.392962636
## [212,]  0.165351926  5.348366e-01     0.14737106  0.005714168
## [213,]  0.871925564  1.216068e+00     0.91489296  0.780050795
## [214,] -0.240431328 -1.294955e+00    -0.25429187 -0.321354258
## [215,] -0.921466160 -8.532011e-01    -0.88724022 -0.841083319
## [216,] -1.122938965 -1.025253e+00    -1.12840260 -0.974638627
## [217,] -0.390826520 -6.020988e-01    -0.38927696 -0.457751168
## [218,]  0.020632024  2.883844e-01     0.01814753 -0.103687521
## [219,] -0.475955874 -8.346009e-01    -0.38680772 -0.505205927
## [220,]  2.594376160  6.394626e-01     2.47462914  2.930007098
## [221,] -0.399339456 -1.281005e+00    -0.41931937 -0.462581892
## [222,] -0.405014746 -1.655333e+00    -0.45635796 -0.454341245
## [223,]  1.533096880 -9.059411e-02     1.54454899  1.597295618
## [224,] -0.759720388  3.906853e-01    -0.74731666 -0.720031061
## [225,] -0.983894353 -9.624771e-01    -1.00740987 -0.867510220
## [226,] -1.569300544 -1.603448e-01    -1.55887333 -1.232371956
## [227,] -1.263118634 -1.429806e+00    -1.14609882 -1.086597758
## [228,]  1.717543814  5.820726e-02     1.72151114  1.691068494
## [229,]  0.968405498  7.056787e-03     0.95193155  0.843134366
## [230,] -0.816473290 -1.048503e+00    -0.84732086 -0.752709487
## [231,] -0.708642775  2.325103e+00    -0.70369343 -0.681385269
## [232,] -0.507169971 -1.008978e+00    -0.56294679 -0.527938745
## [233,]  0.037657895  8.378249e-02     0.24120216 -0.071009095
## [234,]  0.608024567  3.302348e-01     0.61446884  0.451277409
## [235,] -0.385151230  2.357653e+00    -0.43701558 -0.417684576
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## [238,] -1.576678421 -1.439106e+00    -1.54076557 -1.232087796
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## [242,] -1.532694922 -8.043757e-01    -1.48685385 -1.204808414
## [243,] -1.342288933  5.557618e-01    -1.32594175 -1.097111686
## [244,]  0.914490241  8.766148e-01     0.78320019  0.790564724
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## [245,]  1.589849783  1.233079e-01     1.59393378  1.566037992
## [246,] -1.261132283  1.170683e-02    -1.27244156 -1.049088607
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## [249,] -1.683090114 -5.695485e-01    -1.65681982 -1.287214880
## [250,] -0.603649905  2.078651e+00    -0.62550085 -0.603525366
## [251,]  0.258994215 -5.927987e-01     0.27824075  0.098066242
## [252,]  0.434928213  9.091651e-01     0.75027700  0.337044996
## [253,] -0.810798000 -8.811014e-01    -0.76501288 -0.747026283
## [254,]  1.073398368  4.023104e-01     1.33466365  0.963618304
## [255,] -0.053146749 -1.422831e+00    -0.06827584 -0.172454297
## [256,] -1.340018817  5.604119e-01    -1.33211485 -1.090291841
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## [258,] -0.785259194 -3.998219e-01    -0.80163993 -0.724861785
## [259,] -0.382313585 -6.509243e-01    -0.43619250 -0.433029228
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## [261,] -0.575273454 -3.649466e-01    -0.57200067 -0.593011438
## [262,] -1.088887223  1.934499e+00    -1.08231013 -0.947643405
## [263,]  0.378175311  4.425713e-02     0.40046809  0.267141579
## [264,] -0.064497330 -1.154338e-02    -0.13329914 -0.147732357
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## [270,]  1.496207493  9.789157e-01     1.52808739  1.421116275
## [271,] -0.376638295 -4.253972e-01    -0.36705380 -0.416547935
## [272,]  1.430941655  1.281168e+00     1.66389556  1.330185001
## [273,] -0.019095008 -4.904978e-01    -0.09132208 -0.130114423
## [274,] -0.515682906 -6.439492e-01    -0.52590820 -0.522823861
## [275,]  1.433779300  7.440886e-01     1.46224101  1.401225059
## [276,]  3.967796404 -1.905700e-01     3.97263434  5.240229770
## [277,]  0.210754248  2.139837e-01     0.17082883  0.073912623
## [278,]  0.701666856  2.043775e+00     0.67208442  0.577444551
## [279,] -0.927141450  5.092614e-01    -0.96543280 -0.836536755
## [280,] -1.815608141  1.441595e+00    -1.81032420 -1.352855894
## [281,]  1.113125400 -7.299750e-01     1.16181689  0.997717532
## [282,] -0.813635645  1.256329e-01    -0.85061317 -0.758108532
## [283,] -0.586624034 -9.059411e-02    -0.63002779 -0.595568880
## [284,] -0.138276103 -8.578512e-01    -0.18885703 -0.226160580
## [285,]  0.869087919  6.464377e-01     0.80789259  0.776925033
## [286,]  0.145488410 -5.672235e-01     0.09222472  0.031572749
## [287,]  0.017794379  1.050991e+00     0.03707837 -0.125567859
## [288,]  1.635252105  2.256088e-01     1.58570298  1.588770811
## [289,]  1.933204844  9.928658e-01     1.93139649  2.015011156
## [290,] -0.419202972 -2.603207e-01    -0.38186924 -0.481052307
## [291,] -1.334911056  1.997275e+00    -1.34610720 -1.090007681
## [292,] -0.124087878 -7.485752e-01    -0.16992620 -0.215362492
## [293,] -0.101386717  6.975881e-01    -0.05510657 -0.187514789
## [294,] -0.544059357 -2.951960e-01    -0.56212371 -0.558343890
## [295,]  2.236832873  6.069123e-01     2.27297460  2.350320228
## [296,]  2.980295898  5.371617e-01     3.02609260  3.370455455
## [297,]  1.822536683  3.651101e-01     1.88612710  1.855881427
## [298,]  1.612550944  6.650378e-01     1.56512598  1.719484517
## [299,] -0.583786389 -1.360056e+00    -0.58187763 -0.595853040
## [300,]  0.602349276  5.123219e-02     0.73381540  0.457244774
## [301,]  1.436616945 -7.788004e-01     1.41285622  1.426799479
## [302,]  0.037657895 -2.603207e-01    -0.03082571 -0.061915967
## [303,] -0.915790870 -1.471657e+00    -0.95802509 -0.818634661
## [304,] -0.206379587  2.860593e-01    -0.13700300 -0.279014383
## [305,]  0.460467020  2.232838e-01     0.43750668  0.302377448
## [306,]  1.811186103  1.981000e+00     1.74620354  1.887139053
## [307,]  0.310071828  2.634331e+00     0.47042987  0.176210306
## [308,] -0.336911263 -7.253249e-01    -0.36170378 -0.418537056
## [309,]  0.233455409 -1.208194e-01     0.24161370  0.098350403
## [310,] -0.160977264 -1.253105e+00    -0.13906070 -0.265943013
## [311,]  1.799835522  3.209347e-01     1.75854973  1.830307006
## [312,]  0.900302015 -5.137480e-01     0.86550817  0.776640872
## [313,] -0.121250233 -3.835468e-01    -0.17321851 -0.238095310
## [314,] -0.634864002 -4.486474e-01    -0.64895863 -0.623132422
## [315,] -0.240431328  2.302588e-01    -0.19132627 -0.311692810
## [316,] -0.189353716  2.074001e+00    -0.25017647 -0.263669731
## [317,]  1.748757910 -1.150804e+00     1.77501133  1.824623802
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## [317,]  1.748757910 -1.150804e+00     1.77501153  1.824623602
## [318,]  2.577350289  1.785698e+00     2.53224473  2.884541461
## [319,] -0.850525032  7.324634e-01    -0.84279392 -0.785672074
## [320,]  0.179540151 -1.057803e+00     0.11938635  0.039245075
## [321,] -0.475955874 -6.695244e-01    -0.37528460 -0.506342567
## [322,]  0.741393888  5.348366e-01     0.74616160  0.609838817
## [323,]  1.740244975  8.696397e-01     1.66389556  1.730850926
## [324,] -0.623513421  5.208865e-01    -0.63537781 -0.614607615
## [325,] -0.484468810 -9.880524e-01    -0.54977751 -0.506910888
## [326,]  1.229468851 -1.789449e-01     1.19885548  1.193788091
## [327,] -0.027607943  4.557859e-01    -0.08967592 -0.146311556
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## [330,]  2.662479643  1.157942e+00     2.59809111  3.103344838
## [331,] -1.245525234 -1.701834e+00    -1.26462230 -1.041132121
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## [333,] -0.944167321 -2.227289e+00    -0.95473277 -0.844777402
## [334,] -0.552572293 -1.211254e+00    -0.60574694 -0.549819083
## [335,]  0.233455409 -3.998219e-01     0.20087125  0.065956136
## [336,]  0.324260053 -1.483282e+00     0.25519451  0.200648086
## [337,] -0.450417068 -2.835709e-01    -0.51644278 -0.463150212
## [338,] -1.446714274 -4.556225e-01    -1.36544958 -1.149113008
## [339,]  1.317435850  4.976363e-01     1.27293266  1.242095330
## [340,]  0.454791729 -1.862260e+00     0.44573748  0.262310856
## [341,]  0.571135180 -1.029903e+00     0.50746846  0.412347457
## [342,]  1.388376978  1.232343e+00     1.23589407  1.196629693
## [343,]  0.605186921  6.022623e-01     0.63916123  0.488502399
## [344,] -0.802285065 -2.556706e-01    -0.74237818 -0.754414449
## [345,]  0.576810470  5.232115e-01     0.58566104  0.440195160
## [346,] -1.234458418 -5.346732e-01    -1.21276828 -1.036301397
## [347,] -1.489562716 -8.834264e-01    -1.44981526 -1.176108230
## [348,] -0.765395678 -4.602725e-01    -0.75348976 -0.729976669
## [349,]  0.261831860 -5.106875e-02     0.21774438  0.133586271
## [350,] -0.606487550  1.302094e+00    -0.59093150 -0.606935289
## [351,] -0.030445588 -8.439010e-01    -0.09790671 -0.137502588
## [352,]  0.976918434 -9.857273e-01     0.94781615  0.853079974
## [353,] -0.353937134  2.239077e+00    -0.38968850 -0.399498321
## [354,] -0.790934484  4.581109e-01    -0.80205147 -0.734239072
## [355,]  0.185215442  1.081217e+00     0.22350594  0.038108434
## [356,] -1.322992946  3.999854e-01    -1.31112631 -1.095406725
## [357,] -1.206365731 -4.695726e-01    -1.19548360 -1.021525065
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## [361,]  1.802673168  5.046114e-01     1.66801096  1.850198223
## [362,]  0.488843471  1.083542e+00     0.48277607  0.363187737
## [363,] -0.527033487  2.483205e+00    -0.59875076 -0.538452673
## [364,] -1.097400158 -1.643708e+00    -1.07901781 -0.947075085
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## [366,] -0.734181581 -1.127554e+00    -0.71274731 -0.716052817
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## [368,] -1.240701238  2.071676e+00    -1.24651455 -1.034312275
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## [370,]  1.510395719  9.381808e-03     1.42108702  1.460898707
## [371,] -0.450417068 -6.904496e-01    -0.44113098 -0.507479208
## [372,] -1.405852184 -1.262405e+00    -1.34857644 -1.119560344
## [373,] -0.518520551 -6.269385e-02    -0.57981993 -0.541294276
## [374,] -0.558247583 -2.928710e-01    -0.56294679 -0.567152857
## [375,] -0.427715907 -4.974728e-01    -0.46705800 -0.460308610
## [376,] -0.473118229 -1.501882e+00    -0.54072364 -0.504637606
## [377,]  0.173864861  1.425320e+00     0.11239017  0.038960915
## [378,] -0.492981745 -4.207471e-01    -0.46623492 -0.545556679
## [379,] -0.793772129 -1.192654e+00    -0.83044772 -0.733954912
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## [382,] -1.026459030  8.835898e-01    -1.03374843 -0.911270896
## [383,]  0.100086088  5.046114e-01     0.09387087 -0.019007772
## [384,]  0.568297535 -3.277463e-01     0.61858424  0.432806994
## [385,] -0.790934484 -1.580197e-01    -0.79052835 -0.749299564
## [386,] -1.097400158 -6.299991e-01    -1.07490241 -0.949348367
## [387,]  2.163054099  3.953354e-01     2.27708999  2.375894649
## [388,] -1.032134320 -1.580197e-01    -1.03333689 -0.910986735
## [389,] -0.146789039  1.323019e+00    -0.16128386 -0.205132723
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## [390,]  0.616537502 -8.346009e-01     0.52393006  0.468611183
## [391,]  1.027996046  2.032150e+00     1.04247032  0.928382435
## [392,] -0.830661516  2.343703e+00    -0.87654019 -0.764075896
## [393,] -0.138276103 -6.857996e-01    -0.19585321 -0.236106188
## [394,]  1.428104010  1.699672e+00     1.40874083  1.372809036
## [395,] -0.126925523 -6.881246e-01    -0.17321851 -0.225592260
## [396,] -0.070172620 -7.276500e-01    -0.14811458 -0.165634451
## [397,] -0.714318065 -7.602003e-01    -0.67941258 -0.700992325
## [398,]  0.352636505  8.068641e-01     0.33873711  0.208320412
## [399,]  1.575661557  5.557618e-01     1.56101059  1.531938765
## [400,] -1.231620773  1.512081e-01    -1.22881833 -1.024082507
## [401,] -1.214594902 -8.392510e-01    -1.19219128 -1.027776590
## [402,] -0.214892522 -6.741745e-01    -0.24153414 -0.288107511
## [403,]  1.459318106  1.669447e+00     1.47870261  1.441007491
## [404,]  1.848075490 -4.509724e-01     1.76266513  1.932604689
## [405,] -0.251781909  1.953835e-01    -0.20984556 -0.318228495
## [406,]  1.791322587  5.790120e-01     1.72151114  1.813257393
## [407,]  0.579648115 -7.485752e-01     0.58977644  0.379669031
## [408,] -0.771070968 -1.969211e+00    -0.76665904 -0.714916176
## [409,]  0.210754248 -6.090739e-01     0.27453689  0.078459187
## [410,] -1.294048966 -7.857755e-01    -1.30701091 -1.066422381
## [411,] -0.351099488 -1.204279e+00    -0.28886122 -0.405465686
## [412,] -0.796609774  1.811273e+00    -0.83168234 -0.736512354
## [413,] -0.958355547 -1.004328e+00    -0.97572130 -0.851313087
## [414,] -0.685941614 -6.090739e-01    -0.70986653 -0.657231650
## [415,] -0.677428679 -1.225205e+00    -0.72962045 -0.646717721
## [416,]  1.507558074 -1.091943e-01     1.48693340  1.455215502
## [417,] -0.765395678 -9.066766e-01    -0.77818215 -0.724861785
## [418,]  0.083060217 -6.392991e-01     0.08975548 -0.038898989
## [419,]  1.723219104  1.753148e+00     1.71739574  1.645602857
## [420,] -0.660402808 -6.299991e-01    -0.53413900 -0.633362190
## [421,] -1.247511586 -9.183017e-01    -1.16009117 -1.007885374
## [422,]  0.276020086  6.348126e-01     0.21774438  0.164559736
## [423,] -0.844849742 -1.443757e+00    -0.86830939 -0.775726466
## [424,] -1.378894556 -1.492582e+00    -1.25433381 -1.154227893
## [425,] -0.771070968 -1.015953e+00    -0.75883978 -0.718610259
## [426,] -0.410690036  1.057966e+00    -0.38186924 -0.442974836
## [427,] -0.617838131 -1.006653e+00    -0.60657002 -0.648422683
## [428,]  0.207916603 -5.462983e-01     0.12020943  0.053453086
## [429,] -1.125776610  6.983236e-02    -1.12099488 -0.975206947
## [430,]  0.338448279 -4.695726e-01     0.46219908  0.165980537
## [431,] -0.146789039  1.255593e+00    -0.17321851 -0.233832907
## [432,]  1.186904174  3.000095e-01     1.18650928  1.128431238
## [433,] -0.603649905 -8.462260e-01    -0.61809314 -0.601252084
## [434,]  1.237981786 -4.114471e-01     1.20708628  1.173896874
## [435,] -0.895927354 -4.858477e-01    -0.83291696 -0.805279130
## [436,] -0.004906782 -1.490257e+00    -0.07979896 -0.109086565
## [437,]  1.328786430  1.605082e-01     1.19062468  1.270511353
## [438,] -0.345424198 -6.881246e-01    -0.38845388 -0.393530956
## [439,] -1.563341489 -1.743684e+00    -1.54858483 -1.222994668
## [440,] -0.674591034  2.070086e-01    -0.65307403 -0.668029738
## [441,] -0.325560682  1.403185e-02    -0.30655744 -0.400350802
## [442,] -0.143951394  9.161401e-01    -0.19667629 -0.232127945
## [443,]  0.264669505  1.256329e-01     0.34285251  0.144100200
## [444,] -0.186516071 -1.215904e+00    -0.19132627 -0.308567047
## [445,]  0.945704337  4.647799e+00     0.88196977  0.755044695
## [446,] -1.311926130 -1.592558e+00    -1.30166089 -1.082619515
## [447,] -0.107062007  1.041691e+00    -0.14111840 -0.184389026
## [448,] -0.595136970 -3.161212e-01    -0.65348557 -0.593579758
## [449,] -0.634864002 -2.184703e-01    -0.60286616 -0.632793870
## [450,]  0.837873822  1.827549e+00     0.79143099  0.784313199
## [451,] -1.046322546 -8.904015e-01    -1.04321384 -0.924342266
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## [453,]  1.538772170  9.114901e-01     1.51985660  1.475106719
## [454,] -0.640539292  5.232115e-01    -0.62303161 -0.633362190
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## [461,]  3.771998890  1.622947e+00     3.90678796  5.245912975
## [462,]  1.331624075  6.231874e-01     1.30585585  1.293244171
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## [463,] -0.876063838 -1.013628e+00    -0.87654019 -0.801869207
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## [468,]  1.107450110 -5.672235e-01     1.05070112  0.952251895
## [469,] -1.100237803 -7.229999e-01    -1.04732924 -0.939686919
## [470,] -0.024770298 -7.695003e-01    -0.09008746 -0.124147058
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## [472,]  0.239130699  1.093577e-01     0.14531336  0.100339524
## [473,] -0.311372457 -2.021951e-01    -0.38516156 -0.372503099
## [474,]  1.533096880  3.064460e+00     1.48281801  1.614345231
## [475,] -0.592299325  2.057726e+00    -0.62220853 -0.582497509
## [476,]  1.161365367 -9.756917e-02     1.10008591  1.057391180
## [477,] -0.589461680  7.975640e-01    -0.54401596 -0.588464874
## [478,]  1.978607166  2.860593e-01     1.89847330  2.071843202
## [479,]  0.236293054 -4.409368e-02     0.20827896  0.092098878
## [480,] -0.087198491  1.209093e+00     0.01485522 -0.167623573
## [481,]  0.105761378 -1.952936e+00     0.09510549 -0.040319790
## [482,]  0.083060217  1.116827e-01     0.10333629 -0.035204906
## [483,]  1.277708818  1.353244e+00     1.35112524  1.230728920
## [484,] -1.198420325 -2.858959e-01    -1.12634490 -1.001633849
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## [486,]  0.460467020 -1.619343e-02     0.62269963  0.294705122
## [487,] -1.265672515 -1.859200e-01    -1.25433381 -1.039427160
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## [489,] -0.274483070  2.907094e-01    -0.32548827 -0.330163225
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## [491,]  1.101774820  2.953594e-01     1.08773971  1.000559134
## [492,]  1.836724909  2.334403e+00     1.98078127  1.733692528
## [493,]  0.378175311 -1.720434e+00     0.43339128  0.233042352
## [494,] -0.898764999 -3.881968e-01    -0.87160171 -0.822044583
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## [496,] -0.353937134 -2.486956e-01    -0.30943822 -0.459740290
## [497,] -1.206365731  2.565696e-02    -1.15309499 -1.013284418
## [498,] -0.271645425  5.859871e-01    -0.26951885 -0.350622761
## [499,]  1.538772170  2.204202e+00     1.71328034  1.568879595
## [500,]  0.398038827  3.317887e+00     0.48277607  0.255775170
## [501,]  0.727205662  2.116587e-01     0.62269963  0.576023750
## [502,]  0.537083438  9.184652e-01     0.44162208  0.406095932
## [503,]  0.568297535  3.232597e-01     0.66385362  0.408937534
## [504,] -1.009433159  2.163087e-01    -0.89794026 -0.899620326
## [505,] -0.711480420 -2.579956e-01    -0.64155091 -0.699287364
## [506,] -0.824986226  3.376013e+00    -0.87160171 -0.761802615
## [507,]  0.046170830 -5.741986e-01    -0.06868738 -0.063336768
## [508,]  0.193728377 -1.067103e+00     0.11074401  0.073344302
## [509,]  1.927529553  1.348594e+00     2.10012784  1.966703917
## [510,]  0.389525891  4.162605e-01     0.44985288  0.421156424
## [511,] -0.297184231 -8.322759e-01    -0.26087651 -0.383301188
## [512,]  1.079073659  1.206768e+00     0.95604695  0.977542155
## [513,] -0.649052227 -1.370945e-01    -0.57776223 -0.608924411
## [514,] -0.135438458 -1.425156e+00    -0.16828004 -0.244346835
## [515,]  0.630725728  9.300903e-01     0.70089221  0.527148190
## [516,] -0.368125359  7.068882e-01    -0.27610349 -0.431040106
## [517,]  1.828211974 -3.533215e-01     1.68447255  1.907030269
## [518,]  1.578499202  4.557859e-01     1.56512598  1.557513185
## [519,]  1.161365367 -1.370945e-01     1.16593229  1.074440794
## [520,] -0.288671295  7.557137e-01    -0.20367247 -0.356590126
## [521,] -1.034971965 -1.002002e+00    -1.00740987 -0.912975857
## [522,] -0.470280584 -1.603448e-01    -0.44771562 -0.491566235
## [523,]  0.284533021  2.446004e+00     0.19510969  0.183598472
## [524,] -1.806811442  1.220718e+00    -1.81279344 -1.346604368
## [525,] -2.027863997 -1.362381e+00    -1.98275941 -1.453164455
## [526,] -0.356774779 -7.160249e-01    -0.39462698 -0.405465686
## [527,] -0.427715907  1.088192e+00    -0.43701558 -0.450363002
## [528,]  1.084748949  1.674833e-01     0.91489296  0.929519076
## [529,] -0.782421549 -9.291913e-02    -0.81480920 -0.735659873
## [530,] -1.265388750 -2.765958e-01    -1.27203002 -1.047383646
## [531,] -0.620675776  3.418599e-01    -0.58023147 -0.607787770
## [532,] -1.826391193  1.429970e+00    -1.79550876 -1.376725353
## [533,] -0.399339456 -3.765717e-01    -0.45224256 -0.436439151
## [534,]  0.661939824  1.907335e-01     0.71323841  0.505836173
## [535,]  1.606875653  1.355569e+00     1.58158758  1.526255560
```

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## [535,]  1.606875655  1.555569e+00     1.58158758  1.526255560
## [536,] -0.368125359 -8.276259e-01    -0.37363844 -0.420526178
## [537,] -0.739856872 -1.254694e-01    -0.76665904 -0.698719043
## [538,] -0.688779259 -4.176866e-02    -0.72591659 -0.671155501
## [539,] -0.073010265  3.279097e-01    -0.09049900 -0.199165358
## [540,] -0.717155711 -1.499557e+00    -0.72550505 -0.688489275
## [541,]  0.818010306  2.256088e-01     0.72970001  0.708726577
## [542,] -1.371232914 -1.253105e+00    -1.31729941 -1.128369312
## [543,] -0.439066487 -2.068452e-01    -0.49956965 -0.471390859
## [544,]  1.762946136  5.162365e-01     1.80793452  1.730850926
## [545,]  1.717543814  1.088192e+00     2.12893563  1.676860482
## [546,] -0.334073618 -7.602003e-01    -0.36334994 -0.401203282
## [547,] -1.469131671 -8.206508e-01    -1.36750728 -1.164173501
## [548,] -0.387988875 -1.045442e-01    -0.41561551 -0.449794682
## [549,] -0.021932653  1.827549e+00    -0.02424107 -0.154836363
## [550,] -0.589461680 -1.083378e+00    -0.57323529 -0.584202471
## [551,] -0.362450069  4.836862e-01    -0.38433848 -0.398930000
## [552,] -0.847687387 -1.213579e+00    -0.85308241 -0.768054140
## [553,] -0.473118229  1.104467e+00    -0.32919213 -0.508615849
## [554,] -0.674591034 -4.021470e-01    -0.66171636 -0.659220771
## [555,] -0.260294844  1.385794e+00    -0.32384211 -0.332436506
## [556,]  2.123327068  6.952631e-01     2.15774343  2.137200055
## [557,] -0.745532162 -1.952201e-01    -0.76912828 -0.703265607
## [558,]  0.159676636 -1.234505e+00     0.25725221  0.003440886
## [559,] -0.864713257 -1.064778e+00    -0.89547102 -0.801869207
## [560,]  0.190890732 -3.788968e-01     0.16095188  0.056578849
## [561,]  0.034820250  5.650619e-01     0.06835540 -0.062200127
## [562,] -0.546897003 -9.485270e-01    -0.57446991 -0.559764691
## [563,]  0.077384927  1.790348e+00     0.01156290 -0.024975137
## [564,] -0.359612424 -1.387956e+00    -0.37651922 -0.426493543
## [565,] -0.271645425 -2.486956e-01    -0.31643440 -0.334141468
## [566,] -1.097400158 -1.064778e+00    -1.06049852 -0.947075085
## [567,]  0.327097698  7.254884e-01     0.28606000  0.158308211
## [568,]  0.114274313 -1.234505e+00     0.07782082 -0.030374182
## [569,]  2.055223584 -9.741022e-01     2.03016606  2.077526407
##       smoothness_mean compactness_mean concavity_mean  points_mean
##   [1,]     0.457882546     -0.653837927   -0.613766097 -0.307171959
##   [2,]     0.036953503      0.196146087   -0.312711686 -0.579832380
##   [3,]     0.806286653     -0.498004369   -0.731804513 -0.621581896
##   [4,]     1.424881700      0.175317786   -0.532481406 -0.024718442
##   [5,]    -1.189571158     -0.662737292   -0.688277063 -0.575966684
##   [6,]    -0.775041374     -0.513530920   -0.425857969 -0.892696038
##   [7,]    -0.266655790     -0.042432629    0.280992699 -0.202798168
##   [8,]     2.555417474      1.371998332    0.840452144  1.104064774
##   [9,]     0.250973169     -0.351448872   -0.738201920 -0.951196903
##  [10,]     0.493433986     -0.253177162   -0.436896631 -0.399690949
##  [11,]     0.863168956      1.137206580    1.630719971  1.628253144
##  [12,]    -0.698250265     -0.711021080   -0.626560909 -0.659981142
##  [13,]    -0.683318660      0.086324138    0.247124077 -0.356137441
##  [14,]    -1.120601365     -1.258237342   -1.105212334 -1.153321259
##  [15,]     0.486323698     -0.106621665    0.962128302  1.074943198
##  [16,]    -0.826946476      0.542653271    0.176878048 -0.297894289
##  [17,]    -0.123739003     -0.184065074   -0.218883062  0.268301311
##  [18,]     0.457882546     -0.524513115   -0.713364931 -0.717708868
##  [19,]     0.827617517      1.504542064    1.749887342  2.038016914
##  [20,]     0.728073486     -0.175165709   -0.755763427 -0.517981244
##  [21,]     0.098101979     -0.812890405   -0.636094299 -0.425977681
##  [22,]     1.936822428      0.963006247   -0.547534126 -0.093012404
##  [23,]     0.287235637     -0.563140145   -0.493720651 -0.505095591
##  [24,]     1.325337669      1.445844126    0.313606926  0.938612987
##  [25,]     1.126249608      0.491529260   -0.301547585 -0.470046615
##  [26,]     0.308566501      0.447979177   -0.136845735  0.045637224
##  [27,]     0.415220819     -0.429649673   -0.615396808 -0.544267977
##  [28,]     0.841838093      1.237561119    0.997251316  0.994536722
##  [29,]    -0.821258245     -0.228372550   -0.057442634 -0.670031952
##  [30,]    -1.208057907     -0.897150348   -0.840309540 -0.881098950
##  [31,]    -0.912980959     -1.268462144   -1.056704942 -1.033175429
##  [32,]    -0.413127720     -0.884842716   -0.522948016 -0.563854170
##  [33,]    -0.246746984      1.818860055    1.565491516  1.321574599
##  [34,]    -0.676208372     -0.739991353   -0.711107023 -0.576997536
##  [35,]     0.139341649     -0.287070488   -0.082530502 -0.139916181
##  [36,]    -0.972707377     -0.546477505   -0.580900990 -0.623901313
##  [37,]    -0.445835045     -0.027284774    0.240852111  0.788366272
```

```
##  [38,]     1.339558245      0.478274887   -0.648512793 -0.486797964
##  [39,]    -0.548223190     -0.237082566   -0.057442634  0.434010810
##  [40,]     0.728073486      1.436376716    1.329665561  1.072108354
##  [41,]     0.258794485      0.084430656    0.791530803  1.144525725
##  [42,]     1.112029032      1.178863181    2.032125852  2.053479698
##  [43,]     3.280666839      3.399917422    1.914212875  1.450431130
##  [44,]    -0.123739003     -0.088822935   -0.645000492 -0.720028286
##  [45,]    -1.996588834     -0.968534615   -0.834915649 -0.915632501
##  [46,]    -1.610500201     -0.339330588    0.269703158  0.228355786
##  [47,]    -1.055897746     -1.249716674   -0.942166283 -0.907643396
##  [48,]     1.318227381      2.498620049    3.110904155  3.669340602
##  [49,]     0.678301471      0.196146087   -0.037623219  0.126043700
##  [50,]    -0.842589109     -0.055687002   -0.257142060 -0.462057510
##  [51,]     0.443661971      0.896734381    0.128082146  0.182998287
##  [52,]    -0.899471412      0.099578511   -0.297909845 -0.286554914
##  [53,]    -0.390374799     -0.795659720   -0.756014306 -0.838576295
##  [54,]    -1.004703673     -0.008349956    0.269703158 -0.124711110
##  [55,]     1.261345078      1.970338605    3.305335129  2.914241328
##  [56,]     0.813396941      0.930817055    0.352493121  0.539930879
##  [57,]    -1.092871243     -0.146384784   -0.270187751 -0.580605519
##  [58,]    -0.262389617     -1.086687884   -1.093860074 -1.198756072
##  [59,]     3.437093173      3.452934915    4.239858194  3.924476535
##  [60,]     0.521875137      0.754723241    0.925750894  1.178286136
##  [61,]    -0.394640972      2.171047684    1.529114108  1.306369528
##  [62,]     0.607198592      1.059573823    1.594342564  1.427236955
##  [63,]     0.301456213      0.194252605    0.995996923  0.439422784
##  [64,]    -1.048076429     -0.833718706   -0.723776396 -0.737295061
##  [65,]     0.777845502      2.066906181    1.491482307  1.253538350
##  [66,]     0.344117940     -0.053793521   -0.440283493 -0.533444028
##  [67,]    -0.846855282     -1.030072776   -0.668081330 -0.627767009
##  [68,]    -1.434876090     -1.310118746   -0.932382014 -0.776982873
##  [69,]    -0.085343448     -0.519968759   -0.552049943 -0.304337115
##  [70,]     0.372559092     -0.185769207   -0.587047518 -0.704823215
##  [71,]     0.372559092      0.400642130    0.219527423  0.140991057
##  [72,]     0.308566501     -0.588512803   -0.798914559 -0.803269605
##  [73,]     0.236041564      1.758268635    1.363534182  0.004145421
##  [74,]    -1.278449757     -0.798499943   -0.556314880 -0.183985115
##  [75,]    -1.557884071     -0.608015666   -0.467880147 -0.546587394
##  [76,]    -0.614348868     -0.187283993   -0.359375120 -0.295574871
##  [77,]    -0.745178165     -0.372277172   -0.089178787  0.237633456
##  [78,]    -1.064430091     -1.085551795   -0.648638233 -0.686010162
##  [79,]    -0.598706234     -0.470738230   -0.605612540 -0.604057408
##  [80,]     0.514764850      0.493422742    0.392633709  1.013349776
##  [81,]     0.155695311     -0.482667166   -0.787499579 -0.286297201
##  [82,]    -1.106380790     -0.602335220   -0.631703922 -0.834452886
##  [83,]    -0.749444338     -0.768961625   -0.694423591 -0.636013827
##  [84,]     1.197352487      0.559694607    0.136235703  0.559774785
##  [85,]     1.943932716      0.127980740   -0.122921969  0.169597207
##  [86,]    -1.906288177     -1.269598234   -0.830399833 -0.958928295
##  [87,]    -0.450101217     -0.781458606   -0.742843175 -0.578543814
##  [88,]    -0.278032250     -0.569577984   -0.760279243 -0.419534854
##  [89,]    -0.147913982     -0.040539147    0.262176798  0.963868867
##  [90,]     0.199068067      0.050347983   -0.438401903 -0.285781775
##  [91,]    -0.637812818     -1.261077565   -0.998576353 -0.917951918
##  [92,]    -0.503428376     -0.530950954   -0.661182166 -0.650188046
##  [93,]    -1.277027699     -0.912298203   -0.585918564 -0.527001202
##  [94,]    -0.900893470     -1.015114269   -0.962612895 -0.806619875
##  [95,]     0.792066077      2.593294143    1.371060543  0.444834759
##  [96,]    -0.103119168      0.620286027    0.396396889  0.553847384
##  [97,]    -1.624720777     -0.480016291   -0.604985343 -0.775436594
##  [98,]    -0.898760383     -0.907375151   -0.776711796 -0.673124508
##  [99,]     0.692522047     -0.365839334   -0.892115987 -0.767189776
## [100,]     0.706742623      3.070451576    3.074526748  3.494095720
## [101,]     0.841838093      0.465020514   -0.054181212 -0.521846940
## [102,]    -1.909843321     -1.531845474   -1.113892736 -1.260710292
## [103,]     0.140763706     -0.535116614   -0.704333298 -0.550710803
## [104,]     0.164227657     -0.612370674   -0.186268834  0.094602706
## [105,]    -1.721420692     -1.119066424   -0.569987768 -0.975937357
## [106,]     0.585867728     -0.417720737   -0.448060732 -0.753273271
## [107,]    -0.622881213     -0.010243437    0.178132442 -0.129092232
## [108,]     0.941382123      0.205613496   -0.088426151 -0.702503798
## [109,]    -1.026745565     -0.725600890   -0.919712641 -1.050416433
## [110,]     0.386779668     -0.843754160   -1.001561809 -0.983411036
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## [111,]     1.268455366     -0.050006557   -0.227036619 -0.362580268
## [112,]    -0.164267644      0.495316224    0.543160914 -0.701988371
## [113,]     0.642750032      0.107152439    0.713758413  0.972373399
## [114,]     1.190242199      2.366076318    1.555456369  0.807437038
## [115,]    -0.710337754     -1.035374525   -0.906039753 -0.973360227
## [116,]    -0.927912564      0.124193776    0.396396889  0.217531837
## [117,]     0.167782800      0.307861518    0.366291448  0.280413825
## [118,]     1.396440548      0.981941066    1.258165139  1.087828851
## [119,]    -0.179910277      0.497209705    0.481695639  0.979073938
## [120,]     0.841838093      0.493422742    0.090701223  0.183256000
## [121,]    -0.605105493     -0.813837146   -0.935768876 -0.966659687
## [122,]    -0.388241713      0.576735944    0.943312401  1.203284303
## [123,]    -1.537264236     -0.898665134   -0.866275483 -0.922333040
## [124,]    -0.179199249     -0.354478443    0.351238728  0.920830786
## [125,]    -0.398196116     -0.861174193   -0.789381169 -0.662300560
## [126,]    -0.556755536     -0.518832670   -0.694423591 -0.873625271
## [127,]     3.088689066      1.366317887    1.483955946  1.213592825
## [128,]    -0.678341459     -0.719163052   -0.061456693  0.097695263
## [129,]    -1.008969846     -0.455590375    0.049055363  0.189441113
## [130,]     0.528985425      0.209400460    0.721284774  0.321390202
## [131,]     0.221109960      2.237319550    2.314364362  1.241941262
## [132,]    -0.411705663      0.196146087    0.097474948 -0.020595033
## [133,]    -0.686162775     -0.673530139   -0.739205434 -0.416700011
## [134,]     1.040926154      0.218867870    1.945572709  2.318924153
## [135,]     1.638190336      0.052241464   -0.604232707 -0.160790939
## [136,]     1.119139320      0.783125469    0.799057163  1.102518495
## [137,]     0.536095713     -0.569199287   -1.113892736 -1.260710292
## [138,]    -0.231104350     -0.983303774   -0.866526362 -0.754819549
## [139,]     1.104918745      0.023839236    0.777732476  1.299411275
## [140,]    -0.977684579     -1.076084386   -0.866526362 -0.913055370
## [141,]    -0.139381636      0.042774055    0.755153395  0.731669398
## [142,]     1.567087457      3.280628064    2.650541786  2.530248864
## [143,]     0.102368152     -0.017817365    0.692433726  1.262558307
## [144,]     0.607198592      1.826433983    1.564237123  0.969280842
## [145,]     0.642750032      1.561346520    0.673617825  1.002783540
## [146,]     0.308566501     -0.922523006   -0.818733974 -0.860481905
## [147,]     0.052596137      0.470700959    0.134730431  0.441742202
## [148,]     0.035531446     -0.372277172   -0.378567339 -0.014667633
## [149,]    -1.478248846     -1.321668985   -0.945553145 -0.822855798
## [150,]    -0.824102360     -0.685269726   -0.782356566 -0.765643498
## [151,]    -0.799927382     -1.249716674   -1.057783720 -1.095181192
## [152,]     0.792066077     -0.397839178   -1.001825232 -0.753788697
## [153,]    -0.681896603     -0.175165709   -0.499992617 -0.464892354
## [154,]    -0.143647809     -1.030072776   -0.986948126 -1.119096964
## [155,]    -0.625014299      1.197798000    0.594591043  0.440711350
## [156,]     0.322787076     -0.847919820   -0.773952131 -0.898365725
## [157,]    -1.200236590     -1.208438769   -0.863390379 -0.941661520
## [158,]     1.872829837      0.330583300    0.195693949  0.200265062
## [159,]    -1.062297005     -1.130806012   -0.863892136 -0.974391079
## [160,]    -0.628569443     -0.518075277   -0.517930443 -0.388609287
## [161,]    -1.621876662     -1.018522537   -0.704835056 -0.578286101
## [162,]    -1.149042517      0.260524471    0.049431681  0.179390304
## [163,]    -0.634968702     -0.935777379   -0.925482851 -0.722605416
## [164,]    -1.870736738     -1.385668673   -1.067718516 -1.171232316
## [165,]    -0.209062458      0.438511767    0.988470563  1.324151730
## [166,]     0.927161547      1.648446686    2.487470647  3.579141030
## [167,]     0.191957779     -0.532087043   -0.395877967 -0.074457063
## [168,]    -0.452945332      0.434724804    0.102492521  0.673941672
## [169,]    -0.179199249     -0.366596727    0.051815029 -0.363095694
## [170,]    -1.203080705     -0.768393581   -0.752502004 -0.918209631
## [171,]     1.382219972      0.355198565    0.423993544  0.630903590
## [172,]     0.685411759      0.169637341    0.298554206  0.404889234
## [173,]     1.602638897      1.139100062    0.060972100  0.281702390
## [174,]    -1.194548360     -0.411850943   -0.603103753 -0.708688911
## [175,]    -0.418104922     -0.785056221   -0.379069096 -0.374692781
## [176,]     0.211866585     -0.168159826   -0.626059152 -0.664104551
## [177,]     0.635639744      0.423363912    0.545669701  1.057160996
## [178,]    -1.347419549     -1.072865467   -0.773701252 -1.073971407
## [179,]     0.962712987      1.216732819    1.362279789  1.339614513
## [180,]    -1.154019719     -1.211089644   -0.814970794 -0.804558170
## [181,]    -0.035571433     -0.444418832   -0.588678229 -0.202282742
## [182,]    -0.332781467     -0.380608493    0.111524153  0.449989020
## [183,]    -0.311450603     -0.797742550   -0.980550720 -0.766674350
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## [183,]    -0.511450603    -0.797742550   -0.980550720 -0.766074550
## [184,]    -0.540401874    -0.160207202   -0.166825737 -0.209498708
## [185,]     0.642750032    -0.692086261   -1.051097803 -1.065286476
## [186,]    -0.794950180    -1.081764831   -0.958849714 -0.907901109
## [187,]     1.261345078     1.000875885    1.281998613  1.548362094
## [188,]    -0.146491924    -0.137296071    0.332422827  0.503851050
## [189,]    -1.149042517    -0.354099746    0.334931614  0.730380832
## [190,]    -0.425926238    -1.087823973   -0.975533146 -0.898108012
## [191,]     0.060417453     0.177211268    0.071132687  0.270878441
## [192,]    -0.543245989    -0.983114426   -0.786997822 -0.797857631
## [193,]    -1.093582271    -0.356939969   -0.419084245 -0.430616516
## [194,]     1.247124502     1.044425968    0.942058008  0.637088704
## [195,]    -0.027750117    -0.309602922   -0.286871183  0.076562792
## [196,]     1.787506382     1.415548416    1.315867234  2.525094603
## [197,]     0.429441395    -0.125935180    0.435283084  0.428083410
## [198,]    -0.470721052    -0.346147122   -0.724779910 -0.498652765
## [199,]     0.792066077     0.179104750   -0.586922078 -0.448398717
## [200,]    -1.086471984    -0.494406753   -0.256013106 -0.607665390
## [201,]    -0.177066162    -1.004132074   -0.813089204 -0.513600122
## [202,]    -0.593729033    -0.888250984   -0.660554970 -0.898881152
## [203,]    -0.797083266    -0.034858702   -0.253504319 -0.261814460
## [204,]     0.211155557     0.313541963    0.222036210  0.290980060
## [205,]     1.325337669    -0.597033471   -0.611382749 -0.423142837
## [206,]     1.559977170     1.565133484    1.432525818  0.935005004
## [207,]    -0.802060468    -0.867043987   -0.691538486 -0.802754179
## [208,]     0.236041564    -0.855872444   -0.777088114 -0.354848876
## [209,]    -1.606945057    -1.291373275   -1.079296566 -1.146826889
## [210,]     1.261345078     3.386663049    2.005783591  2.594677130
## [211,]    -1.292670332    -0.161721988    0.284755879 -0.387063009
## [212,]     1.232903927     0.608925136    0.508037900  0.832692918
## [213,]     0.763624926     1.489394209    1.008540857  0.786562280
## [214,]    -0.905159642    -0.352016916   -0.477037219 -0.522620080
## [215,]     0.308566501     0.048454501   -0.472270524 -0.855843070
## [216,]     1.211573063    -0.449341885   -0.977916494 -0.928260441
## [217,]     1.147580472     0.139341631   -0.627188106 -0.488859668
## [218,]    -0.501295290     0.122300294   -0.478793369 -0.472623745
## [219,]     2.235454519     1.243241565    0.865540012  0.823930674
## [220,]    -0.851121454     0.192359123    0.546924094  1.239621845
## [221,]     0.022021899    -0.386478286   -0.952326869 -0.764870359
## [222,]    -0.605105493    -0.878594226   -0.817855899 -0.641683515
## [223,]     1.325337669     1.133419616    1.642009512  1.476202437
## [224,]     0.984043850    -0.202999892   -0.538000737 -0.685237022
## [225,]    -0.600128292    -1.161101722   -1.113892736 -1.260710292
## [226,]     0.784955789    -0.868558772   -1.113892736 -1.260710292
## [227,]     2.071917898     2.197556431    0.376326595  0.553074245
## [228,]     1.204462775     0.843716889    1.561728336  1.983897171
## [229,]    -0.474987225     0.292713663    0.185658802  0.669045123
## [230,]    -0.945688283    -1.131563405   -1.101678707 -1.184916880
## [231,]    -0.198397026    -0.352206264   -0.215747078 -0.740903044
## [232,]    -0.678341459    -1.110167060   -0.849341173 -0.731367661
## [233,]    -1.279160785     2.252467405    2.653050573  0.748936173
## [234,]     1.460433139     0.521824970    0.740100674  0.926758186
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## [237,]     0.571647153     1.773416490    1.014812824  1.027266281
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## [239,]     0.014911611    -0.605932836   -0.815472552 -0.844503695
## [240,]     0.756514638    -0.845079597   -0.507895296 -0.469531189
## [241,]     0.941382123     0.446085695    0.114032940  0.091252436
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## [243,]    -1.185304985    -0.829553045   -0.645376810 -1.128555033
## [244,]    -0.692562034    -0.784677525   -0.751247611 -0.529578332
## [245,]     0.699632335     1.525370364    1.917976055  1.249414941
## [246,]    -0.814147957    -1.023256241   -0.820741004 -1.012919182
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## [248,]    -0.568131996     0.353305083    0.151790181 -0.258206477
## [249,]    -0.736645819    -0.850381346   -0.914695068 -1.108221473
## [250,]    -0.852543512    -0.754381815   -0.605236222 -0.759458384
## [251,]     0.175604117     0.607031654   -0.145375610  0.322163341
## [252,]     1.033815866     3.920624938    2.870060627  2.287998585
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## [254,]     1.894160700     2.901931689    2.886367741  1.826692202
## [255,]     2.022145883    -0.128586055    0.153044574  0.444061620
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## [256,]     0.571647153     -0.809482138   -0.857118412 -0.936764972
## [257,]    -0.887383923     -0.498761762   -0.007894096 -0.506899583
## [258,]    -0.553200392     -0.969670704   -0.764795059 -0.719512860
## [259,]     0.138630620     -0.984629211   -0.655662835 -0.522620080
## [260,]     0.101657123     -0.436466208   -0.277964990 -0.028584138
## [261,]     0.464992834     -0.128018010   -0.513916384 -0.403556645
## [262,]    -0.430903440     -0.525649204   -0.361382149 -0.555091926
## [263,]     0.912940971      0.340050710    0.725047954  0.823415248
## [264,]    -1.169662352     -0.967209178   -0.738201920 -0.727244252
## [265,]     1.659521200      0.856971262    1.917976055  1.839577855
## [266,]     2.199903080      1.682529360    1.218024551  1.149679986
## [267,]    -1.124867538     -0.857197881   -0.389606000 -0.984699602
## [268,]     0.104501238      0.923243128   -0.034361796 -0.520558375
## [269,]    -1.026745565     -0.991067050   -0.898889711 -0.935734120
## [270,]     0.450772259      0.974367138    1.456359292  1.029327985
## [271,]    -1.131977826     -0.291425496   -0.186896031 -0.208467856
## [272,]     0.073927000      2.678500827    1.476429586  1.620521752
## [273,]    -1.131266797     -0.960581991   -0.777589872 -0.422885124
## [274,]    -0.329937352     -0.682618852   -0.690911289 -0.675186213
## [275,]    -0.791395036      0.728214494    0.283501485  0.484522570
## [276,]     1.268455366      0.894840900    2.901420462  2.849813062
## [277,]    -0.034860404     -0.395566999   -0.257894696  0.015227083
## [278,]    -0.839744994     -0.038645666    0.046546577  0.105684368
## [279,]    -1.567838474     -1.175302836   -1.113892736 -1.260710292
## [280,]    -1.093582271     -1.052037166   -1.113892736 -1.260710292
## [281,]     0.720963198      2.087734482    0.998505710  1.522590788
## [282,]    -0.799927382     -1.140084073   -1.050332623 -1.114741613
## [283,]    -0.888805980     -0.878594226   -1.019687793 -1.041963444
## [284,]    -0.151469126     -0.720299141   -0.523700652 -0.299182854
## [285,]     0.063972597     -0.272490677    0.022713102  0.421382870
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## [287,]    -0.123027974      0.497209705    0.284755879  0.404631521
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## [289,]     0.308566501      1.065254268    2.288022101  2.115330833
## [290,]     0.799176365      0.550227198   -0.108245566  0.046925790
## [291,]    -1.075806552     -1.034427785   -1.113892736 -1.260710292
## [292,]    -0.948532398     -0.768772277   -0.793269789 -0.737295061
## [293,]     1.680852064      0.423363912    0.623442090  0.421125157
## [294,]    -0.287986653     -0.617104379   -0.562963165 -0.738325913
## [295,]     0.706742623      1.724185962    1.956862249  2.607562783
## [296,]     0.472103122      2.011995207    1.783755963  2.530248864
## [297,]     0.585867728      1.317087358    1.501517454  2.146256400
## [298,]     0.138630620     -0.031071738    0.741355068  1.187048380
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## [300,]     0.443661971      1.608683567    1.690930854  1.108703609
## [301,]    -0.669809113      0.268098398    0.382598562  1.230601888
## [302,]    -2.175768089     -0.987280086   -0.803430375 -0.906612543
## [303,]    -1.508112056     -1.271681064   -1.075131980 -1.090928926
## [304,]     1.012485002      0.805847251    0.698705693  0.845320859
## [305,]     0.436551683      0.304074554    0.324896467  0.404631521
## [306,]    -0.339180726      0.057921910    0.835434571  0.888616653
## [307,]     0.600088304      1.976019051    2.084810374  1.169266179
## [308,]     0.172760002     -0.302597039   -0.700444679 -0.644776071
## [309,]    -1.065141120      0.234015725    0.021333270 -0.342736362
## [310,]     0.621419168      0.281352772   -0.127939542 -0.113629449
## [311,]    -0.341313813      0.510464079    0.796548376  1.355077297
## [312,]     0.315676789     -0.004562992    0.474169279  0.891966923
## [313,]     0.223243046     -0.469034096   -0.543394628 -0.446337013
## [314,]     1.858609261     -0.610477192   -0.370162903  0.647397226
## [315,]     0.550316289      0.743362349    0.121308422  0.326286750
## [316,]    -1.506689998     -1.080818091   -0.954459338 -0.972844801
## [317,]     0.280125349      0.538866307    1.369806149  1.427236955
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## [322,]    -0.018506742      0.554014162    0.577029535  0.290206921
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## [325,]    -1.215879223     -1.333219225   -0.981805113 -0.975164218
## [326,]     0.169204858      0.018158791    0.560722422  1.005876097
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## [328,]     1.360889109      1.341702622    1.561728336  1.182151832
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## [329,]     1.218683351     -0.538714229   -0.720514973 -0.579059240
## [330,]     0.749404350      0.453659622    1.781247177  2.373043896
## [331,]    -0.274477106     -1.198971360   -1.113892736 -1.260710292
## [332,]    -0.355534388     -0.483045862   -0.888478246 -0.722089990
## [333,]    -0.029883203     -0.889576421   -0.796405772 -0.823113511
## [334,]    -1.352396751     -1.367491247   -0.973024360 -1.130539424
## [335,]     1.446212563      0.495316224    0.816618670  0.961807163
## [336,]    -1.033855853     -0.796038416   -0.374804158 -0.447110152
## [337,]    -1.564283330     -1.473904928   -1.098915279 -1.120282444
## [338,]     0.728073486      0.699812266    2.812358532 -0.133215642
## [339,]    -0.369754964      0.678983966    0.215764243  0.308762261
## [340,]     0.564536865      0.483955332    0.380089775  0.339945542
## [341,]    -0.100275053     -0.366028682   -0.423976379 -0.093785543
## [342,]    -0.431614469      0.307861518    0.727556741  0.870834452
## [343,]     1.431991988      0.453659622    1.142760948  0.796097664
## [344,]    -0.031305261      0.533185861    0.827908211 -0.525197210
## [345,]     0.315676789      0.455553104    0.194439556  0.185833130
## [346,]     0.521875137     -0.384395456   -0.570238647 -0.802496466
## [347,]    -0.954931658     -0.518075277   -0.521693623 -0.647095489
## [348,]     0.912940971     -0.179520717   -0.859125441 -0.781106282
## [349,]    -0.299363114     -0.347851256   -0.174853854 -0.143524164
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## [352,]     0.150007081      0.215080906    0.124820723  0.788881698
## [353,]    -1.075806552     -0.872913780   -0.336796039 -0.656888585
## [354,]    -0.623592242     -0.730713292   -0.470012616 -0.771313185
## [355,]     1.481764003      0.824782070    0.475423672  1.066180953
## [356,]     0.571647153     -0.503874163   -0.841438494 -0.873109845
## [357,]     0.891610108     -0.606311532   -0.893621259 -0.757654393
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## [359,]    -0.123027974      0.088217620    0.299808599  0.646366374
## [360,]    -0.281587394     -0.914381034   -0.612637143 -0.930322145
## [361,]    -0.910847873     -0.394998955    0.020329755  0.291237773
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## [367,]     1.076477593      1.176969699    1.213006977  1.455585392
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## [370,]     0.507654562      0.273778844    0.615915730  0.953302632
## [371,]     1.382219972      0.078750211   -0.370288342 -0.415669158
## [372,]    -1.361640125     -0.318691635   -0.362761982 -0.698895815
## [373,]    -0.940711082     -1.180036541   -1.016601986 -1.040752193
## [374,]    -0.390374799     -0.491566530   -0.748111627 -0.867182445
## [375,]    -0.748733309     -0.947516966   -0.741839660 -0.675186213
## [376,]    -1.609789172     -1.210142903   -1.023915099 -0.964597983
## [377,]    -0.967730176     -0.609719800   -0.598964255 -0.480612850
## [378,]     0.557426577      0.480168369   -0.374804158 -0.518496671
## [379,]    -0.182754393     -1.242521443   -1.095239906 -1.174814528
## [380,]     0.351228228     -0.497246976   -0.570991283 -0.505868731
## [381,]    -0.676919401     -0.777103597   -0.945553145 -0.669774239
## [382,]     0.365448804     -0.688677994   -0.800921588 -0.777498299
## [383,]    -0.136537521     -0.092231203    0.396396889  0.011876813
## [384,]     0.543206001      0.976260620    0.584555896  0.737081372
## [385,]     0.607198592     -0.366407378   -0.574252705 -0.592202607
## [386,]    -0.539690845     -0.448395144   -0.567228102 -0.632405844
## [387,]    -0.167111759      1.737440335    1.639500725  1.543207833
## [388,]     0.742294062     -0.711210428   -0.825758577 -0.801981040
## [389,]    -0.105252255     -0.364135200   -0.031978449 -0.103836352
## [390,]    -0.148625011     -0.704772590   -0.420714956 -0.084765586
## [391,]     0.256661399      0.512357560    1.016067217  0.876504139
## [392,]    -1.555039956     -1.301976774   -1.113892736 -1.260710292
## [393,]    -1.387237161     -0.828416956   -0.880951886 -0.816670684
## [394,]     0.401000243      0.775551541    1.295796940  1.229828748
## [395,]    -0.255279329     -0.601956524   -0.894123016 -0.776209734
## [396,]    -1.855805133     -1.060936531   -0.857369290 -1.041473789
## [397,]     0.884499820      0.235909207   -0.223649757 -0.101774648
## [398,]    -0.310028546     -0.014030401    0.293536632  0.667756558
## [399,]     0.114455641      0.559694607    1.223042124  1.581864792
## [400,]     0.429441395     -0.971942883   -1.028230212 -1.056163434
## [401,]    -0.102408139     -0.381555233   -0.821619079 -0.638075532
```

```
## [401,]    -0.102408159     -0.581555235   -0.821619079 -0.658075532
## [402,]    -1.792523571     -0.588702151   -0.098837616 -0.539113716
## [403,]    -0.167111759      1.279217721    0.964637089  0.696104995
## [404,]    -0.135115464      0.061708874    0.801565950  1.043502204
## [405,]    -0.961330917      0.340050710    0.153044574 -0.530609185
## [406,]    -0.345579985      0.165850377    0.115287334  0.745585903
## [407,]     0.173471031      0.747149313   -0.279595701  0.130167109
## [408,]    -0.187020565     -0.709884991   -0.673349782 -0.584728928
## [409,]     1.410661124      1.146673989    1.006032070  1.038863369
## [410,]    -0.833345735     -1.201811582   -0.906666950 -0.831102616
## [411,]    -0.622881213      0.572948981    0.609643763 -0.235012301
## [412,]    -1.957482250     -1.253692986   -0.909050297 -1.180174960
## [413,]    -1.310446052     -1.002617289   -0.831528787 -1.057761255
## [414,]     0.621419168     -0.821600422   -0.663314635 -0.590656328
## [415,]    -1.296225476     -1.153906491   -0.832281423 -0.548649099
## [416,]     0.891610108      0.766084132    1.716018721  1.816383680
## [417,]     0.002113093     -0.671257961   -0.674478736 -0.519785236
## [418,]     0.081748317      0.180998232   -0.109499959 -0.172388027
## [419,]     0.191246750      1.184543627    0.944566795  1.999359954
## [420,]     0.905830684      1.243241565    0.967145875  0.650232070
## [421,]     0.770735214      1.051999895    4.039155254  0.764141244
## [422,]    -0.412416691     -0.634903109   -0.454959895 -0.401494940
## [423,]     0.083881403     -1.007540342   -0.865271969 -0.800434761
## [424,]     4.766717009      2.263828296    0.106632019  0.092798715
## [425,]    -0.410283605     -0.431543155   -0.338552190 -0.652249750
## [426,]     1.126249608      0.413896503    0.301062993  0.510551590
## [427,]     1.382219972      0.307861518   -0.967003271 -0.800177048
## [428,]    -0.506272492     -0.636228546   -0.694172712 -0.519269810
## [429,]     0.280125349     -0.554808825   -1.050859469 -0.973102514
## [430,]     2.640740929      2.349034981    1.956862249  1.940085950
## [431,]    -0.268788876     -0.487022174   -0.450945836 -0.465665493
## [432,]     0.742294062      0.387387757    0.854250472  1.174935866
## [433,]     0.061839511     -0.618997861   -0.593194045 -0.780590856
## [434,]     0.344117940      0.518038006    0.756407788  1.105868765
## [435,]    -0.512671751      0.131767703    0.072387080 -0.329592995
## [436,]    -0.232526408     -0.970996142   -0.892492305 -0.556380491
## [437,]    -0.506983520     -0.861552889   -0.107869248  0.245107135
## [438,]    -1.205213791     -0.959635250   -0.628066181 -0.648126341
## [439,]     0.082459346     -0.977433980   -0.855362261 -1.059719874
## [440,]     0.891610108      0.184785196   -0.255511348 -0.297378863
## [441,]    -0.040548635      0.154489486   -0.222395363 -0.500456756
## [442,]    -0.277321222     -0.698145403   -0.740836146 -0.631117279
## [443,]     0.536095713      0.964899729    1.018576004  1.011030358
## [444,]     0.763624926      0.211293942   -0.388100728  0.096406698
## [445,]     0.125121073      0.482061850    0.663582678  1.009999506
## [446,]     0.429441395     -0.746429191   -0.743094054 -0.725697973
## [447,]    -1.132688855     -0.686784512   -0.524704167 -0.656630872
## [448,]    -1.388659219     -1.238734479   -1.094499814 -1.116597147
## [449,]    -0.194130853      0.209400460   -0.281477291 -0.450975848
## [450,]     0.186269549      0.126087258    0.149281394  0.396642416
## [451,]     0.635639744     -0.513530920   -1.030563384 -0.947331207
## [452,]     0.500544274      0.586203354    0.247124077 -0.085023299
## [453,]     0.329897364      0.519931488    1.214261371  1.370540081
## [454,]    -2.149460023      0.038987091   -0.012911669 -0.645806924
## [455,]     0.097390950     -0.438170342   -0.793395228 -0.699153528
## [456,]     0.237463622     -0.042432629   -0.049289077  0.164958372
## [457,]     2.327888262      0.006797899   -0.251246411  0.428856549
## [458,]    -0.118761802      0.188572160    0.600863010  0.967476850
## [459,]    -0.354112331     -1.166024775   -1.113892736 -1.260710292
## [460,]    -2.406852445     -1.608720838   -1.093885161 -1.212981833
## [461,]     0.856058668      1.788564345    3.445827187  3.092063341
## [462,]     0.386779668      0.654368701    0.885610306  0.992732731
## [463,]    -1.172506467     -0.635281805   -0.669084845 -0.726213399
## [464,]    -0.582352572     -0.703636501   -0.981554235 -1.004620821
## [465,]     1.581308033      2.333887126    1.682150100  2.349849720
## [466,]     0.642750032      0.516144524   -0.142866823 -0.539371429
## [467,]    -0.799927382     -0.981410292   -1.095566049 -1.176670062
## [468,]    -0.489918829      0.357092047    0.253396044  0.351027204
## [469,]     0.692522047      0.127980740   -0.270187751 -0.238877997
## [470,]    -0.837611907     -0.859470059   -0.670590117 -0.502003035
## [471,]    -0.630702530     -0.725790239   -0.723525517 -0.522620080
## [472,]    -0.863919973     -0.962286125   -0.869662345 -0.761004663
## [473,]    -0.464321793     -1.262592351   -0.792517153 -0.507415009
```

```
## [474,]    -0.864631001      0.163956895    0.322387680  0.449731307
## [475,]    -0.628569443     -0.839588499   -0.816977824 -0.648126341
## [476,]     0.078193173      0.139341631    0.303571779  0.788108559
## [477,]    -1.920508753      0.056028428   -0.117528077 -0.493240790
## [478,]     0.034109388      0.249163580    0.858013652  1.715875585
## [479,]    -0.457922534     -0.115710378   -0.368783070 -0.018791042
## [480,]     1.410661124      1.207265409    0.588319076  0.481172301
## [481,]     0.976933562      0.105258957   -0.004758112  0.228355786
## [482,]     0.082459346      0.184785196    0.063731766  0.244076283
## [483,]     0.713852911      1.597322676    1.795045504  1.945240211
## [484,]     0.044774820      0.474487923    0.525599407 -0.303048550
## [485,]    -1.475404731     -1.288343704   -1.009702822 -0.961247713
## [486,]     1.986594443      2.500513531    2.541409563  1.940085950
## [487,]    -0.490629858     -0.790736667   -0.744097568 -0.870532715
## [488,]     2.576748338      3.265480209    4.234840621  3.437398846
## [489,]    -1.636097238     -0.976865935   -0.888101928 -0.937022685
## [490,]     1.794616670      2.102882337    1.004777677  0.380148780
## [491,]     0.265904773      0.465020514    0.353747514  0.739658503
## [492,]     1.524425730      3.269267173    3.294045588  2.656528265
## [493,]     2.086138474      0.968686693    1.435034605  1.566402009
## [494,]     0.036242474     -0.129154099   -0.453705502 -0.542206272
## [495,]     1.986594443     -0.278549819   -0.737574723 -1.022093767
## [496,]     1.808837246      1.169395772   -0.508647932  0.105942081
## [497,]     0.294345925     -0.139568250   -0.341939052 -0.480097424
## [498,]     0.055440252      0.006797899   -0.077889246  0.092798715
## [499,]    -0.267366818      1.930575486    1.123945047  1.687527148
## [500,]     0.706742623      1.127739170    1.082550066  0.903821724
## [501,]    -1.520910574     -0.629033315   -0.656164593 -0.666166256
## [502,]    -1.016791162     -0.712914562   -0.700068361 -0.404329784
## [503,]     1.467543427      1.852942729    1.046172658  1.388579995
## [504,]    -0.400329202      1.167502290    1.746124162  0.270363015
## [505,]     1.503094866      0.832355998    0.165588508  0.173205190
## [506,]    -1.319689426     -1.298947203   -1.051587017 -1.094897707
## [507,]    -2.280289321     -1.469171223   -1.022949216 -1.099639628
## [508,]    -0.827657504     -1.025907116   -0.685391958 -0.605861399
## [509,]     0.962712987      2.258147851    2.867551840  2.537980256
## [510,]     1.112029032      0.998982403    0.795293983  0.924954195
## [511,]     0.792066077      0.429044358   -0.540885842 -0.459222666
## [512,]    -0.555333478     -0.645127911   -0.399013951 -0.038119521
## [513,]     1.033815866      0.894840900    0.413958397  0.074758800
## [514,]     0.007090294     -0.326265563   -0.626184591 -0.600191712
## [515,]     0.075349058      0.858864744    1.157813669  1.000206409
## [516,]     0.884499820      1.430696271    1.012304037  0.507459033
## [517,]    -0.826235447     -0.486643478   -0.023824892  0.547662271
## [518,]     0.941382123      1.051999895    1.362279789  2.035439783
## [519,]     1.311117093      0.836142961    1.108892327  1.471048175
## [520,]     0.273015061      0.832355998   -0.021943302  0.054141755
## [521,]     0.127965188     -0.057580484   -0.319234532 -0.689102718
## [522,]     0.233908478      0.027626200   -0.109750838 -0.275988678
## [523,]    -0.935733880     -1.103729221   -0.526084000 -0.554834212
## [524,]    -3.109348889     -1.149740831   -1.113892736 -1.260710292
## [525,]     1.467543427     -0.542690541   -1.113892736 -1.260710292
## [526,]    -0.150047068     -0.798121246   -0.624679319 -0.844503695
## [527,]    -1.232232885     -0.550075120   -0.431753618 -0.736006496
## [528,]    -0.877429520     -0.702879108   -0.199063646  0.181452008
## [529,]    -0.656299566     -1.027421902   -0.812963765 -0.700699806
## [530,]    -0.942133139     -0.947895663   -0.928367955 -1.112035626
## [531,]    -0.733090675     -0.061367448   -0.289254530 -0.283720070
## [532,]    -0.688295862      0.294607145    0.046672016 -0.909189674
## [533,]    -1.237210087     -1.119445121   -0.938026784 -0.787806821
## [534,]     0.138630620      0.970580175    1.135234588  1.024173724
## [535,]     0.365448804      1.033065077    2.078538407  1.700412801
## [536,]    -0.423793152     -0.409957462   -0.381954201 -0.467469484
## [537,]    -0.079655218     -0.939374994   -0.733058907 -0.673639935
## [538,]    -0.584485658     -0.981031596   -0.915322264 -0.964855696
## [539,]    -0.041259664     -0.048113075   -0.651272459 -0.650188046
## [540,]    -0.464321793     -0.550832513   -0.587549275 -0.397371531
## [541,]    -0.614348868     -0.592678463   -0.242089339  0.128363117
## [542,]     2.896711293      0.343837673   -0.695928863 -0.636786967
## [543,]    -0.883828779     -1.177385666   -1.090561019 -1.185354992
## [544,]     1.467543427      1.574600893    2.103626274  2.615294175
## [545,]     2.292336822      4.564408776    3.595099999  2.873007238
## [546,]     0.294345925     -0.471684971   -0.341813613 -0.392217270
```

```
## [547,]    -0.123739003      0.377920347    0.048051849 -0.665908543
## [548,]     0.028421158     -0.469980837   -0.776711796 -0.801723327
## [549,]     0.208311441      0.156382968   -0.554182411 -0.151513269
## [550,]     0.479213410     -0.254123903   -0.286996622 -0.552257082
## [551,]    -1.482515019     -0.401058097   -0.345451353 -0.779560003
## [552,]    -1.679469994     -0.827470215   -0.548788520 -0.881614376
## [553,]     1.581308033      2.561104951    1.737343408  0.940932405
## [554,]     0.777845502     -0.136538679   -0.451322154 -0.116464292
## [555,]    -0.600839321     -0.990120309   -0.766174892 -0.727759678
## [556,]     1.446212563      1.976019051    2.410952652  2.764767751
## [557,]    -0.206929371     -0.841292633   -0.782983763 -0.727501965
## [558,]     0.479213410      1.500755100    0.704977660  0.362882005
## [559,]     0.301456213     -0.888250984   -0.817479581 -0.595037450
## [560,]    -0.324960150     -0.292372237   -0.603480071 -0.678278770
## [561,]     0.132942390      0.103365475    0.540652128  0.181967434
## [562,]    -0.684740718     -0.736393737   -0.863766697 -0.824659789
## [563,]    -1.877847026     -0.986712041   -0.677865598 -0.813062702
## [564,]     1.211573063     -0.302975736   -0.637223253 -0.384485878
## [565,]    -1.542952466     -0.840724589   -0.504382994 -0.521073801
## [566,]     0.174893088     -0.241437575   -0.664694468 -0.735748783
## [567,]    -0.411705663      0.016265309   -0.439656296 -0.419792568
## [568,]     0.962712987     -0.225721675   -0.248988503  0.413136052
## [569,]     0.265904773      0.892947418    1.309595267  1.973588648
## attr(,"scaled:center")
##      radius_mean     texture_mean   perimeter_mean        area_mean
##      14.12729174      19.28964851      91.96903339     654.88910369
##  smoothness_mean compactness_mean   concavity_mean      points_mean
##       0.09636028       0.10434098       0.08879932       0.04891915
## attr(,"scaled:scale")
##      radius_mean     texture_mean   perimeter_mean        area_mean
##       3.52404883       4.30103577      24.29898104     351.91412918
##  smoothness_mean compactness_mean   concavity_mean      points_mean
##       0.01406413       0.05281276       0.07971981       0.03880284
```

```
matsurv <- matstand[cancer$diagnosis =="B",]
matsurv
```

```
##         radius_mean  texture_mean perimeter_mean    area_mean
##   [1,] -0.512845261 -1.604183e+00    -0.53990056 -0.542146756
##   [2,] -1.000920224 -7.896900e-02    -0.93374423 -0.876603348
##   [3,] -0.876063838 -5.718735e-01    -0.86625169 -0.800448406
##   [4,] -0.807960355 -1.371681e+00    -0.78065139 -0.767485819
##   [5,]  0.301558892 -1.413531e+00     0.23379444  0.161718134
##   [6,] -0.725668646 -5.804381e-02    -0.73126661 -0.696729922
##   [7,] -0.742694517  1.078892e+00    -0.71809733 -0.714347856
##   [8,] -1.032134320  8.172307e-05    -1.01070219 -0.905871851
##   [9,] -0.870388548 -1.006653e+00    -0.84279392 -0.798459284
##  [10,] -0.532708777 -3.137962e-01    -0.56376987 -0.552944845
##  [11,] -0.280158360  3.372098e-01    -0.24647261 -0.335278109
##  [12,] -0.305697166  4.731766e-03    -0.38516156 -0.362841651
##  [13,]  0.131300184  7.882640e-01     0.18194041  0.006282488
##  [14,]  0.449116439 -1.246130e+00     0.41281429  0.303514089
##  [15,] -0.413527681 -4.625975e-01    -0.44113098 -0.468833417
##  [16,] -0.549734648 -1.394931e+00    -0.53043514 -0.565732056
##  [17,] -0.685941614 -4.881728e-01    -0.71151269 -0.666608937
##  [18,] -0.691616904  1.197468e+00    -0.64196245 -0.706107209
##  [19,] -0.904440289 -1.626698e-01    -0.88806330 -0.809541533
##  [20,]  0.276020086 -6.741745e-01     0.31322164  0.055726368
##  [21,] -1.026459030  2.093336e-01    -0.96008279 -0.911270896
##  [22,] -0.192191361 -2.300954e-01    -0.22095714 -0.283560947
##  [23,] -1.282982150 -5.695485e-01    -1.24816071 -1.063864939
##  [24,] -0.206379587 -5.439733e-01    -0.26704961 -0.291233273
##  [25,] -0.305697166 -1.267055e+00    -0.38104616 -0.353180203
##  [26,] -0.527033487 -3.184462e-01    -0.55800831 -0.536463552
##  [27,]  0.128462539 -1.308905e+00     0.09551703  0.011113212
##  [28,] -0.132600813 -9.624771e-01    -0.15222998 -0.211100088
##  [29,] -0.632026357 -1.078728e+00    -0.57035451 -0.631088909
##  [30,] -0.322723037 -1.176379e+00    -0.32466519 -0.399498321
##  [31,] -0.064497330 -6.206990e-01    -0.12342219 -0.157677965
##  [32,] -0.850525032 -6.206990e-01    -0.88477099 -0.777999748
##  [33,] -0.175165490 -9.291913e-02    -0.15922616 -0.275036140
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##  [34,] -0.473118229  1.395830e-01    -0.47487725 -0.521687220
##  [35,]  0.247643635 -8.787763e-01     0.22556364  0.084142391
##  [36,] -0.660402808 -4.718976e-01    -0.68764338 -0.633646351
##  [37,]  0.026307314  1.990300e+00     0.02390909 -0.088058708
##  [38,] -0.223405457 -7.974006e-01    -0.22548408 -0.383301188
##  [39,] -0.677428679 -1.069428e+00    -0.64443169 -0.650411804
##  [40,] -1.148477771 -9.717772e-01    -1.16091425 -0.958725654
##  [41,] -0.507169971  6.813130e-01    -0.49874657 -0.541010116
##  [42,] -0.243268973 -5.276981e-01    -0.30532282 -0.308282887
##  [43,]  0.136975474 -8.369260e-01     0.02925911  0.028446986
##  [44,] -0.078685556 -9.555021e-01    -0.12259911 -0.191777192
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##  [50,] -0.501494680  5.836621e-01    -0.50162735 -0.536463552
##  [51,] -0.799447419 -5.804381e-02    -0.83003618 -0.741058918
##  [52,] -0.387988875 -1.376331e+00    -0.39833083 -0.428482664
##  [53,]  0.239130699 -5.439733e-01     0.17494423  0.088120634
##  [54,] -0.518520551 -7.881005e-01    -0.54072364 -0.543283397
##  [55,] -0.234756038  5.301866e-01    -0.27692657 -0.309135368
##  [56,]  0.145488410 -9.415519e-01     0.15642494 -0.008493844
##  [57,] -0.810798000 -1.471657e+00    -0.77406675 -0.763223416
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##  [60,] -0.212054877  2.657581e+00    -0.23165718 -0.277593582
##  [61,] -0.118412587 -1.417446e-01    -0.13329914 -0.238379470
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##  [65,] -0.331235972 -2.324204e-01    -0.32054980 -0.368524856
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##  [74,] -0.541221712  1.744583e-01    -0.51438508 -0.573404382
##  [75,] -0.938492031  1.143992e+00    -0.94979429 -0.833410993
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##  [77,] -0.705805130 -2.231203e-01    -0.69134724 -0.688773435
##  [78,] -1.676563530  3.279097e-01    -1.59261960 -1.281531676
##  [79,] -0.671753388  5.371617e-01    -0.70986653 -0.645012760
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##  [81,] -0.078685556 -4.835227e-01    -0.14523380 -0.188083109
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## [114,] -0.552572293  2.860593e-01    -0.60698156 -0.557491409
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## [121,]  0.224942474 -1.013628e+00     0.18440965  0.090962237
## [122,]  0.139813120  1.099817e+00     0.10704015  0.022195461
## [123,] -0.189353716 -1.254694e-01    -0.18638779 -0.294927356
## [124,] -0.544059357 -1.208929e+00    -0.54278134 -0.548114121
## [125,] -0.944167321  6.255125e-01    -0.95390969 -0.838241716
## [126,]  0.244805990  6.557377e-01     0.22885596  0.110285132
## [127,] -0.424878262  3.418599e-01    -0.40409239 -0.495828639
## [128,] -0.685941614 -8.927265e-01    -0.69710880 -0.666608937
## [129,] -0.717155711 -2.161453e-01    -0.74443588 -0.688205115
## [130,] -0.178003135 -1.529782e+00    -0.25840727 -0.252019161
## [131,] -0.351099488 -8.346009e-01    -0.32466519 -0.392962636
## [132,] -0.240431328 -1.294955e+00    -0.25429187 -0.321354258
## [133,] -0.921466160 -8.532011e-01    -0.88724022 -0.841083319
## [134,] -1.122938965 -1.025253e+00    -1.12840260 -0.974638627
## [135,] -0.390826520 -6.020988e-01    -0.38927696 -0.457751168
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## [142,] -1.263118634 -1.429806e+00    -1.14609882 -1.086597758
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## [144,] -0.708642775  2.325103e+00    -0.70369343 -0.681385269
## [145,] -0.507169971 -1.008978e+00    -0.56294679 -0.527938745
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## [147,] -0.385151230  2.357653e+00    -0.43701558 -0.417684576
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## [149,] -1.576678421 -1.439106e+00    -1.54076557 -1.232087796
## [150,] -0.986731998  1.378819e+00    -0.98600980 -0.874898386
## [151,] -1.034971965  1.326079e-01    -1.03909844 -0.901325288
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## [157,] -1.683090114 -5.695485e-01    -1.65681982 -1.287214880
## [158,] -0.603649905  2.078651e+00    -0.62550085 -0.603525366
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## [173,] -0.376638295 -4.253972e-01    -0.36705380 -0.416547935
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## [208,] -0.450417068 -2.835709e-01    -0.51644278 -0.463150212
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## [235,] -0.473118229 -1.501882e+00    -0.54072364 -0.504637606
## [236,]  0.173864861  1.425320e+00     0.11239017  0.038960915
## [237,] -0.492981745 -4.207471e-01    -0.46623492 -0.545556679
## [238,] -0.793772129 -1.192654e+00    -0.83044772 -0.733954912
## [239,] -0.739856872 -1.013628e+00    -0.74484742 -0.706391370
## [240,] -0.078685556  7.215739e-02    -0.13535684 -0.177000861
## [241,] -1.026459030  8.835898e-01    -1.03374843 -0.911270896
## [242,] -0.790934484 -1.580197e-01    -0.79052835 -0.749299564
## [243,] -1.097400158 -6.299991e-01    -1.07490241 -0.949348367
## [244,] -1.032134320 -1.580197e-01    -1.03333689 -0.910986735
## [245,]  0.616537502 -8.346009e-01     0.52393006  0.468611183
## [246,] -0.830661516  2.343703e+00    -0.87654019 -0.764075896
## [247,] -0.138276103 -6.857996e-01    -0.19585321 -0.236106188
## [248,] -0.126925523 -6.881246e-01    -0.17321851 -0.225592260
## [249,] -0.070172620 -7.276500e-01    -0.14811458 -0.165634451
## [250,] -0.714318065 -7.602003e-01    -0.67941258 -0.700992325
## [251,] -1.231620773  1.512081e-01    -1.22881833 -1.024082507
```

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## [252,] -1.214594902 -8.392510e-01    -1.19219128 -1.027776590
## [253,] -0.214892522 -6.741745e-01    -0.24153414 -0.288107511
## [254,] -0.251781909  1.953835e-01    -0.20984556 -0.318228495
## [255,]  0.579648115 -7.485752e-01     0.58977644  0.379669031
## [256,] -0.771070968 -1.969211e+00    -0.76665904 -0.714916176
## [257,] -1.294048966 -7.857755e-01    -1.30701091 -1.066422381
## [258,] -0.351099488 -1.204279e+00    -0.28886122 -0.405465686
## [259,] -0.796609774  1.811273e+00    -0.83168234 -0.736512354
## [260,] -0.958355547 -1.004328e+00    -0.97572130 -0.851313087
## [261,] -0.685941614 -6.090739e-01    -0.70986653 -0.657231650
## [262,] -0.677428679 -1.225205e+00    -0.72962045 -0.646717721
## [263,] -0.765395678 -9.066766e-01    -0.77818215 -0.724861785
## [264,]  0.083060217 -6.392991e-01     0.08975548 -0.038898989
## [265,] -1.247511586 -9.183017e-01    -1.16009117 -1.007885374
## [266,] -0.844849742 -1.443757e+00    -0.86830939 -0.775726466
## [267,] -1.378894556 -1.492582e+00    -1.25433381 -1.154227893
## [268,] -0.771070968 -1.015953e+00    -0.75883978 -0.718610259
## [269,] -0.617838131 -1.006653e+00    -0.60657002 -0.648422683
## [270,]  0.207916603 -5.462983e-01     0.12020943  0.053453086
## [271,] -1.125776610  6.983236e-02    -1.12099488 -0.975206947
## [272,] -0.603649905 -8.462260e-01    -0.61809314 -0.601252084
## [273,] -0.895927354 -4.858477e-01    -0.83291696 -0.805279130
## [274,] -0.004906782 -1.490257e+00    -0.07979896 -0.109086565
## [275,] -0.345424198 -6.881246e-01    -0.38845388 -0.393530956
## [276,] -1.563341489 -1.743684e+00    -1.54858483 -1.222994668
## [277,] -0.674591034  2.070086e-01    -0.65307403 -0.668029738
## [278,] -0.325560682  1.403185e-02    -0.30655744 -0.400350802
## [279,] -0.143951394  9.161401e-01    -0.19667629 -0.232127945
## [280,] -0.186516071 -1.215904e+00    -0.19132627 -0.308567047
## [281,] -1.311926130 -1.592558e+00    -1.30166089 -1.082619515
## [282,] -0.107062007  1.041691e+00    -0.14111840 -0.184389026
## [283,] -0.595136970 -3.161212e-01    -0.65348557 -0.593579758
## [284,] -0.634864002 -2.184703e-01    -0.60286616 -0.632793870
## [285,] -1.046322546 -8.904015e-01    -1.04321384 -0.924342266
## [286,] -0.640539292  5.232115e-01    -0.62303161 -0.633362190
## [287,] -0.634864002  4.371857e-01    -0.64113937 -0.628247306
## [288,]  0.088735507 -9.555021e-01     0.08234776 -0.042024751
## [289,] -0.169490200 -1.941311e+00    -0.16704542 -0.271910377
## [290,] -1.548301970 -1.125229e+00    -1.54529251 -1.215322342
## [291,] -0.317047747  6.813130e-01    -0.40985395 -0.365114933
## [292,] -0.876063838 -1.013628e+00    -0.87654019 -0.801869207
## [293,] -0.098549072 -8.136758e-01    -0.14811458 -0.196039596
## [294,] -0.490144100 -3.742467e-01    -0.43207711 -0.531632828
## [295,] -0.263132489 -8.067007e-01    -0.32507673 -0.334141468
## [296,] -1.100237803 -7.229999e-01    -1.04732924 -0.939686919
## [297,] -0.024770298 -7.695003e-01    -0.09008746 -0.124147058
## [298,] -0.385151230  4.929862e-01    -0.40944241 -0.419105377
## [299,]  0.239130699  1.093577e-01     0.14531336  0.100339524
## [300,] -0.311372457 -2.021951e-01    -0.38516156 -0.372503099
## [301,] -0.592299325  2.057726e+00    -0.62220853 -0.582497509
## [302,] -0.589461680  7.975640e-01    -0.54401596 -0.588464874
## [303,]  0.236293054 -4.409368e-02     0.20827896  0.092098878
## [304,]  0.105761378 -1.952936e+00     0.09510549 -0.040319790
## [305,] -1.198420325 -2.858959e-01    -1.12634490 -1.001633849
## [306,] -0.700129840 -5.160730e-01    -0.75184360 -0.664619816
## [307,] -1.265672515 -1.859200e-01    -1.25433381 -1.039427160
## [308,] -0.274483070  2.907094e-01    -0.32548827 -0.330163225
## [309,] -0.898764999 -3.881968e-01    -0.87160171 -0.822044583
## [310,] -1.569016779  3.930103e-01    -1.53541555 -1.230666995
## [311,] -0.353937134 -2.486956e-01    -0.30943822 -0.459740290
## [312,] -1.206365731  2.565696e-02    -1.15309499 -1.013284418
## [313,] -1.009433159  2.163087e-01    -0.89794026 -0.899620326
## [314,] -0.711480420 -2.579956e-01    -0.64155091 -0.699287364
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## [318,] -0.297184231 -8.322759e-01    -0.26087651 -0.383301188
## [319,] -0.135438458 -1.425156e+00    -0.16828004 -0.244346835
## [320,] -0.288671295  7.557137e-01    -0.20367247 -0.356590126
## [321,] -1.034971965 -1.002002e+00    -1.00740987 -0.912975857
## [322,] -0.470280584 -1.603448e-01    -0.44771562 -0.491566235
## [323,] -1.806811442  1.220718e+00    -1.81279344 -1.346604368
## [324,] -2.027863997 -1.362381e+00    -1.98275941 -1.453164455
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## [325,] -0.356774779 -7.160249e-01    -0.39462698 -0.405465686
## [326,] -0.427715907  1.088192e+00    -0.43701558 -0.450363002
## [327,] -0.782421549 -9.291913e-02    -0.81480920 -0.735659873
## [328,] -1.265388750 -2.765958e-01    -1.27203002 -1.047383646
## [329,] -0.620675776  3.418599e-01    -0.58023147 -0.607787770
## [330,] -1.826391193  1.429970e+00    -1.79550876 -1.376725353
## [331,] -0.399339456 -3.765717e-01    -0.45224256 -0.436439151
## [332,] -0.368125359 -8.276259e-01    -0.37363844 -0.420526178
## [333,] -0.739856872 -1.254694e-01    -0.76665904 -0.698719043
## [334,] -0.688779259 -4.176866e-02    -0.72591659 -0.671155501
## [335,] -0.073010265  3.279097e-01    -0.09049900 -0.199165358
## [336,] -0.717155711 -1.499557e+00    -0.72550505 -0.688489275
## [337,] -1.371232914 -1.253105e+00    -1.31729941 -1.128369312
## [338,] -0.439066487 -2.068452e-01    -0.49956965 -0.471390859
## [339,] -0.334073618 -7.602003e-01    -0.36334994 -0.401203282
## [340,] -1.469131671 -8.206508e-01    -1.36750728 -1.164173501
## [341,] -0.387988875 -1.045442e-01    -0.41561551 -0.449794682
## [342,] -0.021932653  1.827549e+00    -0.02424107 -0.154836363
## [343,] -0.589461680 -1.083378e+00    -0.57323529 -0.584202471
## [344,] -0.362450069  4.836862e-01    -0.38433848 -0.398930000
## [345,] -0.847687387 -1.213579e+00    -0.85308241 -0.768054140
## [346,] -0.674591034 -4.021470e-01    -0.66171636 -0.659220771
## [347,] -0.260294844  1.385794e+00    -0.32384211 -0.332436506
## [348,] -0.745532162 -1.952201e-01    -0.76912828 -0.703265607
## [349,]  0.159676636 -1.234505e+00     0.25725221  0.003440886
## [350,] -0.864713257 -1.064778e+00    -0.89547102 -0.801869207
## [351,]  0.190890732 -3.788968e-01     0.16095188  0.056578849
## [352,] -0.546897003 -9.485270e-01    -0.57446991 -0.559764691
## [353,]  0.077384927  1.790348e+00     0.01156290 -0.024975137
## [354,] -0.359612424 -1.387956e+00    -0.37651922 -0.426493543
## [355,] -0.271645425 -2.486956e-01    -0.31643440 -0.334141468
## [356,] -1.097400158 -1.064778e+00    -1.06049852 -0.947075085
## [357,]  0.114274313 -1.234505e+00     0.07782082 -0.030374182
##        smoothness_mean compactness_mean concavity_mean  points_mean
##   [1,]     0.457882546     -0.653837927   -0.613766097 -0.307171959
##   [2,]     0.036953503      0.196146087   -0.312711686 -0.579832380
##   [3,]     0.806286653     -0.498004369   -0.731804513 -0.621581896
##   [4,]     1.424881700      0.175317786   -0.532481406 -0.024718442
##   [5,]    -1.189571158     -0.662737292   -0.688277063 -0.575966684
##   [6,]    -0.775041374     -0.513530920   -0.425857969 -0.892696038
##   [7,]    -0.266655790     -0.042432629    0.280992699 -0.202798168
##   [8,]     0.250973169     -0.351448872   -0.738201920 -0.951196903
##   [9,]     0.493433986     -0.253177162   -0.436896631 -0.399690949
##  [10,]    -0.698250265     -0.711021080   -0.626560909 -0.659981142
##  [11,]    -0.683318660      0.086324138    0.247124077 -0.356137441
##  [12,]    -1.120601365     -1.258237342   -1.105212334 -1.153321259
##  [13,]    -0.826946476      0.542653271    0.176878048 -0.297894289
##  [14,]    -0.123739003     -0.184065074   -0.218883062  0.268301311
##  [15,]     0.457882546     -0.524513115   -0.713364931 -0.717708868
##  [16,]     0.728073486     -0.175165709   -0.755763427 -0.517981244
##  [17,]     0.098101979     -0.812890405   -0.636094299 -0.425977681
##  [18,]     1.936822428      0.963006247   -0.547534126 -0.093012404
##  [19,]     0.287235637     -0.563140145   -0.493720651 -0.505095591
##  [20,]     1.325337669      1.445844126    0.313606926  0.938612987
##  [21,]     1.126249608      0.491529260   -0.301547585 -0.470046615
##  [22,]     0.415220819     -0.429649673   -0.615396808 -0.544267977
##  [23,]    -0.821258245     -0.228372550   -0.057442634 -0.670031952
##  [24,]    -1.208057907     -0.897150348   -0.840309540 -0.881098950
##  [25,]    -0.912980959     -1.268462144   -1.056704942 -1.033175429
##  [26,]    -0.676208372     -0.739991353   -0.711107023 -0.576997536
##  [27,]     0.139341649     -0.287070488   -0.082530502 -0.139916181
##  [28,]    -0.972707377     -0.546477505   -0.580900990 -0.623901313
##  [29,]     1.339558245      0.478274887   -0.648512793 -0.486797964
##  [30,]    -0.123739003     -0.088822935   -0.645000492 -0.720028286
##  [31,]    -1.996588834     -0.968534615   -0.834915649 -0.915632501
##  [32,]    -1.055897746     -1.249716674   -0.942166283 -0.907643396
##  [33,]     0.678301471      0.196146087   -0.037623219  0.126043700
##  [34,]    -0.842589109     -0.055687002   -0.257142060 -0.462057510
##  [35,]    -0.899471412      0.099578511   -0.297909845 -0.286554914
##  [36,]    -0.390374799     -0.795659720   -0.756014306 -0.838576295
##  [37,]    -1.004703673     -0.008349956    0.269703158 -0.124711110
##  [38,]     0.813396941      0.930817055    0.352493121  0.539930879
##  [39,]    -1.092871243     -0.146384784   -0.270187751 -0.580605519
```

```
##  [39,]    -1.09287245    -0.14038478   -0.27018751 -0.38660519
##  [40,]    -0.262389617   -1.086687884  -1.093860074 -1.198756072
##  [41,]     0.344117940   -0.053793521  -0.440283493 -0.533444028
##  [42,]    -0.846855282   -1.030072776  -0.668081330 -0.627767009
##  [43,]    -1.434876090   -1.310118746  -0.932382014 -0.776982873
##  [44,]    -0.085343448   -0.519968759  -0.552049943 -0.304337115
##  [45,]     0.372559092   -0.185769207  -0.587047518 -0.704823215
##  [46,]     0.308566501   -0.588512803  -0.798914559 -0.803269605
##  [47,]     0.236041564    1.758268635   1.363534182  0.004145421
##  [48,]    -1.278449757   -0.798499943  -0.556314880 -0.183985115
##  [49,]    -1.557884071   -0.608015666  -0.467880147 -0.546587394
##  [50,]    -0.614348868   -0.187283993  -0.359375120 -0.295574871
##  [51,]    -1.064430091   -1.085551795  -0.648638233 -0.686010162
##  [52,]    -0.598706234   -0.470738230  -0.605612540 -0.604057408
##  [53,]     0.155695311   -0.482667166  -0.787499579 -0.286297201
##  [54,]    -1.106380790   -0.602335220  -0.631703922 -0.834452886
##  [55,]    -0.749444338   -0.768961625  -0.694423591 -0.636013827
##  [56,]     1.197352487    0.559694607   0.136235703  0.559774785
##  [57,]     1.943932716    0.127980740  -0.122921969  0.169597207
##  [58,]    -1.906288177   -1.269598234  -0.830399833 -0.958928295
##  [59,]    -0.450101217   -0.781458606  -0.742843175 -0.578543814
##  [60,]    -0.278032250   -0.569577984  -0.760279243 -0.419534854
##  [61,]     0.199068067    0.050347983  -0.438401903 -0.285781775
##  [62,]    -0.637812818   -1.261077565  -0.998576353 -0.917951918
##  [63,]    -0.503428376   -0.530950954  -0.661182166 -0.650188046
##  [64,]    -0.900893470   -1.015114269  -0.962612895 -0.806619875
##  [65,]    -1.624720777   -0.480016291  -0.604985343 -0.775436594
##  [66,]    -0.898760383   -0.907375151  -0.776711796 -0.673124508
##  [67,]     0.692522047   -0.365839334  -0.892115987 -0.767189776
##  [68,]     0.841838093    0.465020514  -0.054181212 -0.521846940
##  [69,]    -1.909843321   -1.531845474  -1.113892736 -1.260710292
##  [70,]     0.140763706   -0.535116614  -0.704333298 -0.550710803
##  [71,]    -1.721420692   -1.119066424  -0.569987768 -0.975937357
##  [72,]     0.585867728   -0.417720737  -0.448060732 -0.753273271
##  [73,]    -0.622881213   -0.010243437   0.178132442 -0.129092232
##  [74,]     0.941382123    0.205613496  -0.088426151 -0.702503798
##  [75,]    -1.026745565   -0.725600890  -0.919712641 -1.050416433
##  [76,]     0.386779668   -0.843754160  -1.001561809 -0.983411036
##  [77,]     1.268455366   -0.050006557  -0.227036619 -0.362580268
##  [78,]    -0.164267644    0.495316224   0.543160914 -0.701988371
##  [79,]    -0.710337754   -1.035374525  -0.906039753 -0.973360227
##  [80,]     0.841838093    0.493422742   0.090701223  0.183256000
##  [81,]    -0.605105493   -0.813837146  -0.935768876 -0.966659687
##  [82,]    -1.537264236   -0.898665134  -0.866275483 -0.922333040
##  [83,]    -0.398196116   -0.861174193  -0.789381169 -0.662300560
##  [84,]    -0.556755536   -0.518832670  -0.694423591 -0.873625271
##  [85,]    -0.411705663    0.196146087   0.097474948 -0.020595033
##  [86,]    -0.686162775   -0.673530139  -0.739205434 -0.416700011
##  [87,]     1.638190336    0.052241464  -0.604232707 -0.160790939
##  [88,]     0.536095713   -0.569199287  -1.113892736 -1.260710292
##  [89,]    -0.231104350   -0.983303774  -0.866526362 -0.754819549
##  [90,]    -0.977684579   -1.076084386  -0.866526362 -0.913055370
##  [91,]     0.308566501   -0.922523006  -0.818733974 -0.860481905
##  [92,]     0.035531446   -0.372277172  -0.378567339 -0.014667633
##  [93,]    -1.478248846   -1.321668985  -0.945553145 -0.822855798
##  [94,]    -0.824102360   -0.685269726  -0.782356566 -0.765643498
##  [95,]    -0.799927382   -1.249716674  -1.057783720 -1.095181192
##  [96,]     0.792066077   -0.397839178  -1.001825232 -0.753788697
##  [97,]    -0.681896603   -0.175165709  -0.499992617 -0.464892354
##  [98,]    -0.143647809   -1.030072776  -0.986948126 -1.119096964
##  [99,]    -0.625014299    1.197798000   0.594591043  0.440711350
## [100,]     0.322787076   -0.847919820  -0.773952131 -0.898365725
## [101,]    -1.200236590   -1.208438769  -0.863390379 -0.941661520
## [102,]    -1.062297005   -1.130806012  -0.863892136 -0.974391079
## [103,]    -0.628569443   -0.518075277  -0.517930443 -0.388609287
## [104,]    -1.621876662   -1.018522537  -0.704835056 -0.578286101
## [105,]    -1.149042517    0.260524471   0.049431681  0.179390304
## [106,]    -0.634968702   -0.935777379  -0.925482851 -0.722605416
## [107,]    -1.870736738   -1.385668673  -1.067718516 -1.171232316
## [108,]     0.191957779   -0.532087043  -0.395877967 -0.074457063
## [109,]    -0.179199249   -0.366596727   0.051815029 -0.363095694
## [110,]    -1.203080705   -0.768393581  -0.752502004 -0.918209631
## [111,]    -1.194548360   -0.411850943  -0.603103753 -0.708688911
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## [112,]     0.211866585     -0.168159826   -0.626059152 -0.664104551
## [113,]    -1.347419549     -1.072865467   -0.773701252 -1.073971407
## [114,]    -1.154019719     -1.211089644   -0.814970794 -0.804558170
## [115,]    -0.035571433     -0.444418832   -0.588678229 -0.202282742
## [116,]    -0.311450603     -0.797742550   -0.980550720 -0.766674350
## [117,]     0.642750032     -0.692086261   -1.051097803 -1.065286476
## [118,]    -0.794950180     -1.081764831   -0.958849714 -0.907901109
## [119,]    -0.425926238     -1.087823973   -0.975533146 -0.898108012
## [120,]    -0.543245989     -0.983114426   -0.786997822 -0.797857631
## [121,]    -1.093582271     -0.356939969   -0.419084245 -0.430616516
## [122,]    -0.470721052     -0.346147122   -0.724779910 -0.498652765
## [123,]     0.792066077      0.179104750   -0.586922078 -0.448398717
## [124,]    -1.086471984     -0.494406753   -0.256013106 -0.607665390
## [125,]    -0.593729033     -0.888250984   -0.660554970 -0.898881152
## [126,]    -0.797083266     -0.034858702   -0.253504319 -0.261814460
## [127,]     0.211155557      0.313541963    0.222036210  0.290980060
## [128,]     1.325337669     -0.597033471   -0.611382749 -0.423142837
## [129,]    -0.802060468     -0.867043987   -0.691538486 -0.802754179
## [130,]    -1.606945057     -1.291373275   -1.079296566 -1.146826889
## [131,]    -1.292670332     -0.161721988    0.284755879 -0.387063009
## [132,]    -0.905159642     -0.352016916   -0.477037219 -0.522620080
## [133,]     0.308566501      0.048454501   -0.472270524 -0.855843070
## [134,]     1.211573063     -0.449341885   -0.977916494 -0.928260441
## [135,]     1.147580472      0.139341631   -0.627188106 -0.488859668
## [136,]    -0.501295290      0.122300294   -0.478793369 -0.472623745
## [137,]     0.022021899     -0.386478286   -0.952326869 -0.764870359
## [138,]    -0.605105493     -0.878594226   -0.817855899 -0.641683515
## [139,]     0.984043850     -0.202999892   -0.538000737 -0.685237022
## [140,]    -0.600128292     -1.161101722   -1.113892736 -1.260710292
## [141,]     0.784955789     -0.868558772   -1.113892736 -1.260710292
## [142,]     2.071917898      2.197556431    0.376326595  0.553074245
## [143,]    -0.945688283     -1.131563405   -1.101678707 -1.184916880
## [144,]    -0.198397026     -0.352206264   -0.215747078 -0.740903044
## [145,]    -0.678341459     -1.110167060   -0.849341173 -0.731367661
## [146,]    -1.279160785      2.252467405    2.653050573  0.748936173
## [147,]    -0.967019147     -1.173977399   -0.863390379 -0.874398411
## [148,]     1.168911336     -0.221745363   -0.577137810 -0.453552979
## [149,]     0.514764850     -0.530572257   -0.792140835 -0.871563567
## [150,]     0.014911611     -0.605932836   -0.815472552 -0.844503695
## [151,]     0.756514638     -0.845079597   -0.507895296 -0.469531189
## [152,]     1.325337669     -0.422833138   -0.595577393 -0.764870359
## [153,]    -1.185304985     -0.829553045   -0.645376810 -1.128555033
## [154,]    -0.814147957     -1.023256241   -0.820741004 -1.012919182
## [155,]    -1.080072724     -1.234947515   -1.082909219 -1.127756123
## [156,]    -0.568131996      0.353305083    0.151790181 -0.258206477
## [157,]    -0.736645819     -0.850381346   -0.914695068 -1.108221473
## [158,]    -0.852543512     -0.754381815   -0.605236222 -0.759458384
## [159,]     0.175604117      0.607031654   -0.145375610  0.322163341
## [160,]    -0.903737585      0.133661185    0.149281394 -0.550195377
## [161,]     2.022145883     -0.128586055    0.153044574  0.444061620
## [162,]     0.571647153     -0.809482138   -0.857118412 -0.936764972
## [163,]    -0.887383923     -0.498761762   -0.007894096 -0.506899583
## [164,]    -0.553200392     -0.969670704   -0.764795059 -0.719512860
## [165,]     0.138630620     -0.984629211   -0.655662835 -0.522620080
## [166,]     0.101657123     -0.436466208   -0.277964990 -0.028584138
## [167,]     0.464992834     -0.128018010   -0.513916384 -0.403556645
## [168,]    -0.430903440     -0.525649204   -0.361382149 -0.555091926
## [169,]    -1.169662352     -0.967209178   -0.738201920 -0.727244252
## [170,]    -1.124867538     -0.857197881   -0.389606000 -0.984699602
## [171,]     0.104501238      0.923243128   -0.034361796 -0.520558375
## [172,]    -1.026745565     -0.991067050   -0.898889711 -0.935734120
## [173,]    -1.131977826     -0.291425496   -0.186896031 -0.208467856
## [174,]    -1.131266797     -0.960581991   -0.777589872 -0.422885124
## [175,]    -0.329937352     -0.682618852   -0.690911289 -0.675186213
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## [177,]    -1.567838474     -1.175302836   -1.113892736 -1.260710292
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## [179,]    -0.799927382     -1.140084073   -1.050332623 -1.114741613
## [180,]    -0.888805980     -0.878594226   -1.019687793 -1.041963444
## [181,]    -0.151469126     -0.720299141   -0.523700652 -0.299182854
## [182,]    -0.707493639     -0.707423464   -0.462611695 -0.541433133
## [183,]     0.799176365      0.550227198   -0.108245566  0.046925790
## [184,]    -1.075806552     -1.034427785   -1.113892736 -1.260710292
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## [185,]    -0.948532398     -0.768772277   -0.793269789 -0.737295061
## [186,]    -0.287986653     -0.617104379   -0.562963165 -0.738325913
## [187,]     0.969823275     -0.269839803   -0.639606600 -0.539629142
## [188,]    -2.175768089     -0.987280086   -0.803430375 -0.906612543
## [189,]    -1.508112056     -1.271681064   -1.075131980 -1.090928926
## [190,]     0.172760002     -0.302597039   -0.700444679 -0.644776071
## [191,]    -1.065141120      0.234015725    0.021333270 -0.342736362
## [192,]     0.621419168      0.281352772   -0.127939542 -0.113629449
## [193,]     0.223243046     -0.469034096   -0.543394628 -0.446337013
## [194,]     1.858609261     -0.610477192   -0.370162903  0.647397226
## [195,]    -1.506689998     -1.080818091   -0.954459338 -0.972844801
## [196,]    -0.049792009     -0.424158576   -0.508773371 -0.679051909
## [197,]    -0.541112902     -0.502548725   -0.535868268 -0.351498606
## [198,]    -0.086765506      0.885373490    0.822890637 -0.011832789
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## [200,]    -1.215879223     -1.333219225   -0.981805113 -0.975164218
## [201,]    -0.402462288     -0.660654462   -0.930500424 -0.772086325
## [202,]     1.218683351     -0.538714229   -0.720514973 -0.579059240
## [203,]    -0.274477106     -1.198971360   -1.113892736 -1.260710292
## [204,]    -0.355534388     -0.483045862   -0.888478246 -0.722089990
## [205,]    -0.029883203     -0.889576421   -0.796405772 -0.823113511
## [206,]    -1.352396751     -1.367491247   -0.973024360 -1.130539424
## [207,]    -1.033855853     -0.796038416   -0.374804158 -0.447110152
## [208,]    -1.564283330     -1.473904928   -1.098915279 -1.120282444
## [209,]     0.728073486      0.699812266    2.812358532 -0.133215642
## [210,]     0.564536865      0.483955332    0.380089775  0.339945542
## [211,]    -0.100275053     -0.366028682   -0.423976379 -0.093785543
## [212,]    -0.031305261      0.533185861    0.827908211 -0.525197210
## [213,]     0.521875137     -0.384395456   -0.570238647 -0.802496466
## [214,]    -0.954931658     -0.518075277   -0.521693623 -0.647095489
## [215,]     0.912940971     -0.179520717   -0.859125441 -0.781106282
## [216,]     0.472103122     -0.230266032   -0.431377300 -0.159244661
## [217,]    -1.187438072     -0.918925390   -0.852100838 -0.577255249
## [218,]    -1.075806552     -0.872913780   -0.336796039 -0.656888585
## [219,]    -0.623592242     -0.730713292   -0.470012616 -0.771313185
## [220,]     0.571647153     -0.503874163   -0.841438494 -0.873109845
## [221,]     0.891610108     -0.606311532   -0.893621259 -0.757654393
## [222,]    -0.543957017     -0.669175131   -0.779095144 -0.901715995
## [223,]    -0.281587394     -0.914381034   -0.612637143 -0.930322145
## [224,]    -1.377282758     -1.332272484   -1.113892736 -1.260710292
## [225,]     0.255950370     -0.547613594   -0.872672890 -0.753530984
## [226,]     0.578757441     -0.639447465   -0.801548785 -0.502776174
## [227,]     0.247418025      0.145022076   -0.268807918 -0.592202607
## [228,]    -1.174639553     -1.099752909   -0.920590716 -0.991915567
## [229,]    -0.738778906     -0.845458293   -0.942417161 -1.031165267
## [230,]     1.382219972      0.078750211   -0.370288342 -0.415669158
## [231,]    -1.361640125     -0.318691635   -0.362761982 -0.698895815
## [232,]    -0.940711082     -1.180036541   -1.016601986 -1.040752193
## [233,]    -0.390374799     -0.491566530   -0.748111627 -0.867182445
## [234,]    -0.748733309     -0.947516966   -0.741839660 -0.675186213
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## [246,]    -1.555039956     -1.301976774   -1.113892736 -1.260710292
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## [256,]    -0.187020565     -0.709884991   -0.673349782 -0.584728928
## [257,]    -0.833345735     -1.201811582   -0.906666950 -0.831102616
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## [257,]    -0.853545755    -1.201811582   -0.906666950 -0.851102616
## [258,]    -0.622881213     0.572948981    0.609643763 -0.235012301
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## [265,]     0.770735214     1.051999895    4.039155254  0.764141244
## [266,]     0.083881403    -1.007540342   -0.865271969 -0.800434761
## [267,]     4.766717009     2.263828296    0.106632019  0.092798715
## [268,]    -0.410283605    -0.431543155   -0.338552190 -0.652249750
## [269,]     1.382219972     0.307861518   -0.967003271 -0.800177048
## [270,]    -0.506272492    -0.636228546   -0.694172712 -0.519269810
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## [272,]     0.061839511    -0.618997861   -0.593194045 -0.780590856
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## [285,]     0.635639744    -0.513530920   -1.030563384 -0.947331207
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## [310,]     1.986594443    -0.278549819   -0.737574723 -1.022093767
## [311,]     1.808837246     1.169395772   -0.508647932  0.105942081
## [312,]     0.294345925    -0.139568250   -0.341939052 -0.480097424
## [313,]    -0.400329202     1.167502290    1.746124162  0.270363015
## [314,]     1.503094866     0.832355998    0.165588508  0.173205190
## [315,]    -1.319689426    -1.298947203   -1.051587017 -1.094897707
## [316,]    -2.280289321    -1.469171223   -1.022949216 -1.099639628
## [317,]    -0.827657504    -1.025907116   -0.685391958 -0.605861399
## [318,]     0.792066077     0.429044358   -0.540885842 -0.459222666
## [319,]     0.007090294    -0.326265563   -0.626184591 -0.600191712
## [320,]     0.273015061     0.832355998   -0.021943302  0.054141755
## [321,]     0.127965188    -0.057580484   -0.319234532 -0.689102718
## [322,]     0.233908478     0.027626200   -0.109750838 -0.275988678
## [323,]    -3.109348889    -1.149740831   -1.113892736 -1.260710292
## [324,]     1.467543427    -0.542690541   -1.113892736 -1.260710292
## [325,]    -0.150047068    -0.798121246   -0.624679319 -0.844503695
## [326,]    -1.232232885    -0.550075120   -0.431753618 -0.736006496
## [327,]    -0.656299566    -1.027421902   -0.812963765 -0.700699806
## [328,]    -0.942133139    -0.947895663   -0.928367955 -1.112035626
## [329,]    -0.733090675    -0.061367448   -0.289254530 -0.283720070
```

```
## [330,]    -0.688295862      0.294607145    0.046672016 -0.909189674
## [331,]    -1.237210087     -1.119445121   -0.938026784 -0.787806821
## [332,]    -0.423793152     -0.409957462   -0.381954201 -0.467469484
## [333,]    -0.079655218     -0.939374994   -0.733058907 -0.673639935
## [334,]    -0.584485658     -0.981031596   -0.915322264 -0.964855696
## [335,]    -0.041259664     -0.048113075   -0.651272459 -0.650188046
## [336,]    -0.464321793     -0.550832513   -0.587549275 -0.397371531
## [337,]     2.896711293      0.343837673   -0.695928863 -0.636786967
## [338,]    -0.883828779     -1.177385666   -1.090561019 -1.185354992
## [339,]     0.294345925     -0.471684971   -0.341813613 -0.392217270
## [340,]    -0.123739003      0.377920347    0.048051849 -0.665908543
## [341,]     0.028421158     -0.469980837   -0.776711796 -0.801723327
## [342,]     0.208311441      0.156382968   -0.554182411 -0.151513269
## [343,]     0.479213410     -0.254123903   -0.286996622 -0.552257082
## [344,]    -1.482515019     -0.401058097   -0.345451353 -0.779560003
## [345,]    -1.679469994     -0.827470215   -0.548788520 -0.881614376
## [346,]     0.777845502     -0.136538679   -0.451322154 -0.116464292
## [347,]    -0.600839321     -0.990120309   -0.766174892 -0.727759678
## [348,]    -0.206929371     -0.841292633   -0.782983763 -0.727501965
## [349,]     0.479213410      1.500755100    0.704977660  0.362882005
## [350,]     0.301456213     -0.888250984   -0.817479581 -0.595037450
## [351,]    -0.324960150     -0.292372237   -0.603480071 -0.678278770
## [352,]    -0.684740718     -0.736393737   -0.863766697 -0.824659789
## [353,]    -1.877847026     -0.986712041   -0.677865598 -0.813062702
## [354,]     1.211573063     -0.302975736   -0.637223253 -0.384485878
## [355,]    -1.542952466     -0.840724589   -0.504382994 -0.521073801
## [356,]     0.174893088     -0.241437575   -0.664694468 -0.735748783
## [357,]     0.962712987     -0.225721675   -0.248988503  0.413136052
```

```
matnosurv <- matstand[cancer$diagnosis == "M",]
vecmediansurv <- apply(matsurv, 2, median)
# in the above 2 represents column. Hence, we are asking for column median
vecmediansurv
```

```
##      radius_mean     texture_mean   perimeter_mean        area_mean
##       -0.5468970       -0.4416723       -0.5674737       -0.5583439
##  smoothness_mean compactness_mean   concavity_mean      points_mean
##       -0.3981961       -0.5500751       -0.6486382       -0.6566309
```

```
vecmediannosurv <- apply(matnosurv, 2, median)
matabsdevsurv <- abs(matsurv - matrix(rep(vecmediansurv,nrow(matsurv)),nrow=nrow(matsurv), byrow=TRUE))

matabsdevnosurv <- abs(matnosurv - matrix(rep(vecmediannosurv,nrow(matnosurv)),nrow=nrow(matnosurv), byrow=T
RUE))

matabsdevnosurv
```

```
##        radius_mean texture_mean perimeter_mean   area_mean smoothness_mean
##   [1,] 0.997432264  0.532429890    0.931726312 0.949663490      2.14019666
##   [2,] 0.926491136  0.051150470    0.971234142 1.102541694      0.44794814
##   [3,] 0.642726623  0.823057559    0.555578852 0.735974997      0.07110288
##   [4,] 0.784608879  0.558005125    0.843656776 0.895104725      0.41239670
##   [5,] 1.000269909  1.318287107    0.978230320 0.988593441      0.10665432
##   [6,] 0.574623139  0.885833135    0.485617071 0.567183820      0.42661727
##   [7,] 1.292547358  0.234827157    1.336681565 1.209670100      0.82834854
##   [8,] 0.078035241  0.434778993    0.197539148 0.137817712      0.66196780
##   [9,] 0.458279689  0.034875320    0.386847497 0.562637256      0.86105586
##  [10,] 0.154651660  0.618455680    0.201654546 0.129861225      0.96344401
##  [11,] 0.307884497  0.625430744    0.222231541 0.360599332      0.31285267
##  [12,] 0.847037072  1.302011958    0.769579596 1.011610420      0.15642633
##  [13,] 0.642726623  0.769582068    0.679040820 0.801331849      0.69680821
##  [14,] 1.675629451  0.251102306    1.507059080 1.551230697      2.86544602
##  [15,] 0.214242208  0.088350811    0.131692765 0.261427412      2.02572102
##  [16,] 2.385040734  0.930008541    2.469239344 3.063247283      0.90300656
##  [17,] 0.983244039  1.053234673    0.956418706 1.003369773      0.02844115
##  [18,] 1.692655322  1.211336125    1.839583311 2.139726534      0.84612426
##  [19,] 1.965069255  0.292952690    2.140007431 2.355688309      3.02187235
##  [20,] 0.588811365  0.762607004    0.535001858 0.605261291      0.10665432
##  [21,] 0.495169076  0.778882153    0.580271246 0.488755596      0.80986179
##  [22,] 0.041145854  0.748656876    0.078192579 0.149468281      0.19197777
```

```
##  [23,] 0.026957629  0.953258755    0.012346197 0.045465637      0.11376461
##  [24,] 1.102425134  0.027900256    1.153134774 1.048551250      1.46329725
##  [25,] 0.563272559  1.674015374    0.481501672 0.646748684      0.36262468
##  [26,] 1.091074554  0.148801367    1.061772918 1.059349339      0.04266173
##  [27,] 0.279508046  0.669606150    0.181077552 0.309734651      1.16039898
##  [28,] 0.188703401  0.186001708    0.148154361 0.169643657      0.09954403
##  [29,] 1.088236908  0.367353374    0.946541749 1.341236287      0.56313480
##  [30,] 0.486656140  0.483604441    0.584386645 0.492733839      1.69224852
##  [31,] 0.881088814  0.385953545    0.816083603 0.915280102      0.37684526
##  [32,] 0.367475045  1.383387705    0.345693508 0.394414400      0.51833999
##  [33,] 2.240320832  0.802132367    2.358123574 2.688155779      0.29152180
##  [34,] 0.750557138  0.309227840    0.800856627 0.703296570      0.25099316
##  [35,] 0.378825625  1.009059267    0.296308721 0.412032334      0.22752921
##  [36,] 1.020133425  0.267377456    0.847772175 1.005074735      0.77502138
##  [37,] 0.015607048  0.920708456    0.074077180 0.009093127      1.34313338
##  [38,] 0.815822976  0.288302648    0.811145125 0.822075546      0.24743802
##  [39,] 0.520707882  0.346428182    0.485617071 0.532232111      0.98121973
##  [40,] 0.702317170  0.023250214    0.637886831 0.846797486      0.59513110
##  [41,] 0.923653491  0.158101452    0.843656776 1.017293625      0.80346253
##  [42,] 1.244307391  0.978833990    1.098811508 1.744743814      0.59442007
##  [43,] 1.196067424  1.371762598    1.110746165 1.141755805      2.67346825
##  [44,] 0.773258299  0.425478908    0.832545199 0.759560296      1.09356228
##  [45,] 0.475305560  0.592880445    0.378616699 0.585370074      1.42419066
##  [46,] 0.866900588  0.253427327    0.840775997 0.858732216      0.11376461
##  [47,] 0.688128945  0.248777285    0.497963268 0.701875769      0.19411086
##  [48,] 1.201742714  0.216226986    1.144080896 1.554356460      0.62570533
##  [49,] 0.191541046  0.018600171    0.172846754 0.077859903      0.70391850
##  [50,] 0.075197596  0.106950982    0.098769574 0.038077471      0.68969793
##  [51,] 0.364637400  0.281327584    0.325116514 0.460339573      0.55460246
##  [52,] 0.188703401  2.576123659    0.353924306 0.196070559      1.15186664
##  [53,] 0.795959460  1.578689499    0.699617814 0.934887158      0.31285267
##  [54,] 0.872575878  0.160426473    0.731717926 0.813550739      0.19197777
##  [55,] 0.778933589  0.016275149    0.690975476 0.816108181      0.22752921
##  [56,] 0.438416173  0.830032623    0.436232284 0.429081948      0.36262468
##  [57,] 1.808998772  0.025575235    1.740813738 1.593854732      1.45760902
##  [58,] 1.635902419  0.378978481    1.559736186 2.131201727      0.62428328
##  [59,] 2.807849859  0.095325875    2.794355858 3.745231836      0.51194073
##  [60,] 0.009931758  0.155776431    0.008230798 0.044897316      0.86816615
##  [61,] 1.179041553  0.651005979    1.161365571 1.129252755      0.96699915
##  [62,] 0.949192297  0.427803929    0.949834068 0.944832766      0.27019094
##  [63,] 1.025808716  0.146476345    0.987695738 1.006211376      1.18741808
##  [64,] 1.105262779  0.425478908    1.167127130 1.041731404      0.83332574
##  [65,] 0.534896108  0.671931171    0.465040076 0.625152507      0.22041892
##  [66,] 0.375987980  0.897458242    0.390962896 0.409190732      0.54749217
##  [67,] 0.356124464  0.420828865    0.415655290 0.324795143      0.74800229
##  [68,] 0.625700752  1.111360207    0.634594511 0.612081136      0.95562269
##  [69,] 0.078035241  0.553355082    0.032923191 0.105139285      0.84612426
##  [70,] 0.319235077  0.104625961    0.246923934 0.406349129      0.56171274
##  [71,] 0.804472395  0.418503843    0.695502415 0.971827988      1.56426334
##  [72,] 0.344773884  0.792832281    0.374501301 0.338150674      0.35480337
##  [73,] 0.790284170  1.413612982    0.718960189 0.776325749      0.83190368
##  [74,] 0.461117334  0.267377456    0.535001858 0.470001021      0.44297094
##  [75,] 0.503682011  1.122985313    0.613194437 0.568320461      1.37228556
##  [76,] 0.637051332  0.995109139    0.666694623 0.612081136      0.01422058
##  [77,] 0.662590139  0.869557986    0.767933436 0.662661657      0.59228698
##  [78,] 0.529220817  0.578930317    0.428001486 0.570309582      1.14475635
##  [79,] 1.579149516  0.771907089    1.613236371 1.423358594      0.17917925
##  [80,] 1.068373393  1.188085911    1.172888688 1.076967273      0.84612426
##  [81,] 0.742044202  0.030225278    0.767521896 0.781724794      0.81768311
##  [82,] 0.035470564  0.711456534    0.000000000 0.007388166      0.34840411
##  [83,] 1.383352002  1.339212299    1.301700674 1.292644888      1.82023370
##  [84,] 1.686980032  0.134851238    1.559736186 2.142568137      1.26634227
##  [85,] 0.625700752  0.595205466    0.629656033 0.809856656      0.91011685
##  [86,] 0.810147685  0.446404100    0.806618186 0.903629532      0.78924196
##  [87,] 0.061009370  0.497554569    0.037038590 0.055695405      0.89020804
##  [88,] 0.299371562  0.174376601    0.300424120 0.336161552      1.04521232
##  [89,] 0.699479525  0.406878737    0.567925049 0.740521560      0.15642633
##  [90,] 0.954867587  1.025334417    0.937076331 0.936592119      0.52616130
##  [91,] 0.007094113  0.372003416    0.131692765 0.003125763      1.10778285
##  [92,] 0.682453654  0.381303502    0.679040820 0.778599031      0.28441152
##  [93,] 0.472467915  0.404553715    0.164615956 0.450393965      0.61859505
##  [94,] 0.166002240  0.102300940    0.419770688 0.176179343      1.47893988
##  [95,] 0.529220817  0.460354228    0.514424863 0.520297382      0.49772015
```

```
##  [96,] 0.086548177  0.585905381    0.057615585 0.092920395      1.24430038
##  [97,] 1.227281520  0.083700769    1.098811508 1.171308469      1.78468226
##  [98,] 0.588811365  0.474304356    0.613194437 0.633677314      0.03555144
##  [99,] 0.523545527  0.776557132    0.749002601 0.542746040      0.34129382
## [100,] 0.526383172  0.239477199    0.547348055 0.613786097      1.20661586
## [101,] 3.060400276  0.695181384    3.057741388 4.452790809      0.85323455
## [102,] 0.205729272  1.539164136    0.242808535 0.209994410      1.25496581
## [103,] 0.205729272  1.234586338    0.246923934 0.210278570      0.30574238
## [104,] 0.038308209  0.141826303    0.107000372 0.010513929      0.35124822
## [105,] 0.889601749  0.546380018    0.877814587 0.913006820      0.53824879
## [106,] 0.727855977  0.279002562    0.670810022 0.801331849      0.10665432
## [107,] 1.025808716  0.488254484    1.016503530 1.227572195      0.10665432
## [108,] 1.008782845  0.192976772    0.969999522 0.974953750      1.26563124
## [109,] 1.329436745  0.102300940    1.358081639 1.562881267      0.29152180
## [110,] 2.072899770  0.032550299    2.111199639 2.583016494      0.05688230
## [111,] 0.915140555  0.139501281    0.971234142 1.068442466      0.17064691
## [112,] 0.705154816  0.160426473    0.650233027 0.932045555      0.27659020
## [113,] 0.305046852  0.453379164    0.181077552 0.330194188      0.02844115
## [114,] 0.529220817  1.283411787    0.497963268 0.639360518      1.08502993
## [115,] 1.113775715  0.218552007    1.051895961 1.066453344      0.59726418
## [116,] 0.446929108  0.281327584    0.477386273 0.485061513      0.02133086
## [117,] 0.903789975  1.476388559    0.831310579 1.099700091      0.75440155
## [118,] 0.597324300  2.129719559    0.444463082 0.611228655      0.18486749
## [119,] 0.892439394  0.183676687    0.843656776 1.042868045      0.75653463
## [120,] 0.007094113  1.018359353    0.049384787 0.010798089      0.09954403
## [121,] 1.147827456  0.274352520    1.106219226 1.099131771      0.13509547
## [122,] 0.841361782  1.655415203    0.860118371 1.037184841      0.13509547
## [123,] 1.669954161  1.281086765    1.617351770 2.097102500      0.50554147
## [124,] 0.166002240  0.030225278    0.168731355 0.177600144      0.43372756
## [125,] 0.832848847  0.365028352    0.749002601 0.943411965      0.81199488
## [126,] 0.322072723  0.683556278    0.283962525 0.406349129      0.24601596
## [127,] 0.438416173  0.337128096    0.349808907 0.424535384      0.94566829
## [128,] 1.755083515  0.653331000    1.683198153 2.315905877      0.33418353
## [129,] 0.673940719  0.904433306    0.714021710 0.721482825      1.03099174
## [130,] 0.410039722  0.006975064    0.358039705 0.454656369      0.78497578
## [131,] 0.480980850  0.727731683    0.321001115 0.409190732      0.84683529
## [132,] 0.302209207  0.097650897    0.275731727 0.298936562      1.01677117
## [133,] 0.330585658  0.018600171    0.329231913 0.347243801      0.09954403
## [134,] 0.645564268  0.555680103    0.697148575 0.653852690      0.71458393
## [135,] 0.069522306  1.490338687    0.032923191 0.065641013      0.26521374
## [136,] 0.722180686  0.576605295    0.691387016 0.749330527      1.06654318
## [137,] 0.262482175  0.344103160    0.222231541 0.306893049      0.53824879
## [138,] 0.895277039  0.000000000    0.753118000 1.062759261      1.32606869
## [139,] 0.418552657  0.578930317    0.432116885 0.424251224      1.29336137
## [140,] 0.100736402  0.167401537    0.131692765 0.090078793      0.66125677
## [141,] 0.602999591  0.495229548    0.506194066 0.673459746      0.09243374
## [142,] 0.807310040  0.000000000    0.821022082 0.806446734      0.55175834
## [143,] 0.339098593  0.832357644    0.296308721 0.354631967      0.12798518
## [144,] 1.255657971  0.109276004    1.362197038 1.588455687      0.58233258
## [145,] 1.054185167  0.818407516    1.076176814 0.992571684      0.52047307
## [146,] 0.120599918  1.527539029    0.127577366 0.140943474      0.15855942
## [147,] 0.520707882  1.195060975    0.493847869 0.585370074      0.01422058
## [148,] 0.554759623  0.302252776    0.576155847 0.579118549      0.72524936
## [149,] 0.668265429  0.051150470    0.646117628 0.744499803      0.30076518
## [150,] 0.551921978  1.164835698    0.563809650 0.653568530      0.58233258
## [151,] 0.940679362  0.955583776    0.847772175 1.145165728      0.55033628
## [152,] 0.883926459  0.074400683    0.806618186 1.025818431      0.76080080
## [153,] 0.696641880  1.113685228    0.640356070 0.708979775      0.99544030
## [154,] 0.600161946  0.613805637    0.572040448 0.667776541      0.47638929
## [155,] 0.815822976  1.248536466    0.802502787 0.858163896      0.22397407
## [156,] 1.567798936  1.134610420    1.449031955 1.420801152      0.49060986
## [157,] 0.631376042  0.130201196    0.697148575 0.622879225      0.82763751
## [158,] 1.318086164  0.553355082    1.296762195 1.230413797      0.71102879
## [159,] 0.568947849  0.974183947    0.452693880 0.621458424      2.22552011
## [160,] 1.054185167  0.750981897    1.088111471 1.021271868      0.68400970
## [161,] 0.279508046  0.204601879    0.271616328 0.340992276      0.32707324
## [162,] 0.330585658  0.916058413    0.292193322 0.386457913      0.07110288
## [163,] 0.421390302  0.344103160    0.275731727 0.483072392      0.92220434
## [164,] 0.642726623  0.378978481    0.572040448 0.643338761      0.12087489
## [165,] 0.038308209  4.143188051    0.032923191 0.032394266      0.29009975
## [166,] 0.069522306  1.322937150    0.123461967 0.003125763      0.22895127
## [167,] 1.414566099  1.255511530    1.360139339 1.291792407      0.08532345
## [168,] 0.631376042  0.406878737    0.604963639 0.687667757      0.08532345
```

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## [168,] 0.631376042  0.406878757    0.604963639 0.687667757      0.08552345
## [169,] 0.966218168  2.245970627    0.884810765 1.383860322      0.53398262
## [170,] 2.864602762  1.118335271    2.991895005 4.458474014      0.44083785
## [171,] 0.424227947  0.118576089    0.390962896 0.505805210      0.02844115
## [172,] 0.052496435  1.176460804    0.074077180 0.054842924      1.16608721
## [173,] 0.200053982  1.071834844    0.135808164 0.164812934      0.90513965
## [174,] 0.625700752  2.559848509    0.567925049 0.826906270      1.27985182
## [175,] 0.253969239  0.602180530    0.185192951 0.269952219      0.33702765
## [176,] 1.071211038  0.218552007    0.983580339 1.284404241      0.38111143
## [177,] 0.994594619  0.704481470    0.900037741 0.955062534      0.99544030
## [178,] 0.824335911  0.392928609    0.811556664 0.822643867      0.33276147
## [179,] 0.370312690  0.848632794    0.436232284 0.443289959      0.29863209
## [180,] 0.446929108  0.520804783    0.292193322 0.492733839      1.57137362
## [181,] 1.403215518  0.416178822    1.588543978 1.639604529      2.16152752
## [182,] 1.772109386  0.611480616    1.683198153 1.620849954      1.37939585
## [183,] 0.194378692  0.209251922    0.172846754 0.213120173      0.14931605
## [184,] 0.929328781  1.829791805    1.065888317 0.946253567      1.10920491
## [185,] 0.529220817  2.225045435    0.481501672 0.554396609      1.67091765
## [186,] 1.179041553  0.081375747    1.184411805 1.138061722      0.35978057
## [187,] 0.631376042  1.699590609    0.798387388 0.781440633      0.68258764
## [188,] 0.509357301  2.813275837    0.432116885 0.531663791      0.29152180
## [189,] 0.180190466  0.292952690    0.292193322 0.211415211      1.93613139
## [190,] 0.370312690  0.413853801    0.473270874 0.381343029      1.43201198
## [191,] 0.339098593  0.181351666    0.251039333 0.378501427      1.05232261
## [192,] 1.020133425  0.843982751    1.185234885 1.179264956      0.54749217
## [193,] 0.517870237  0.088350811    0.465040076 0.366282537      0.69680821
## [194,] 0.171677531  0.702156449    0.041153989 0.190103194      0.97055430
## [195,] 1.556448355  0.641705893    1.492655183 1.396363372      0.61859505
## [196,] 0.276670400  0.425478908    0.214000743 0.260290771      0.33987176
## [197,] 1.275521487  0.202276858    1.190996444 1.218479068      0.46927900
## [198,] 0.920815846  0.857932879    0.769579596 1.119591307      1.24145627
## [199,] 0.671103074  0.048825448    0.650233027 0.770074224      0.52616130
## [200,] 0.253969239  0.641705893    0.251039333 0.287001833      0.89589627
## [201,] 0.622863107  1.941392830    0.719783269 0.603840489      1.35095470
## [202,] 0.177352821  0.337128096    0.000000000 0.142080115      1.29265034
## [203,] 0.245456304  0.313877883    0.201654546 0.281602788      0.27659020
## [204,] 0.699479525  0.850957815    0.666694623 0.738816599      0.04977202
## [205,] 0.089385822  0.279002562    0.185192951 0.078712384      1.02956969
## [206,] 0.855550008  0.011625107    0.893041563 0.943411965      1.05232261
## [207,] 0.810147685  0.583580360    1.214042677 0.889421521      1.87711600
## [208,] 1.380514357  0.599855509    1.244085089 1.296054810      1.16608721
## [209,] 1.215930939  0.190651751    1.242850470 1.349761094      1.03099174
## [210,] 0.872575878  0.060450555    0.846537555 0.849639089      0.28227843
## [211,] 0.580298430  0.220877029    0.628832953 0.629130750      0.82692648
## [212,] 1.147827456  1.478713580    1.115273104 1.290087446      0.14931605
##        compactness_mean concavity_mean points_mean
##   [1,]      0.841652694    0.055820505 0.141226758
##   [2,]      0.606860941    0.846088332 0.665415129
##   [3,]      0.636967303    0.177496663 0.112105182
##   [4,]      0.974196426    0.965255703 1.075178899
##   [5,]      0.082366462    0.921477374 0.917200791
##   [6,]      0.707215481    0.212619677 0.031698707
##   [7,]      1.415188355    1.307579655 1.526692185
##   [8,]      1.288514417    0.780859877 0.358736584
##   [9,]      0.557630413    0.543779529 0.174471744
##  [10,]      0.767428205    0.842074273 0.528827205
##  [11,]      0.906031078    0.545033922 0.109270339
##  [12,]      0.445914982    0.006899164 0.181687709
##  [13,]      0.648517543    1.247494213 1.090641682
##  [14,]      2.869571784    1.129581235 0.487593115
##  [15,]      0.869676226    0.514928481 0.734482229
##  [16,]      1.968274411    2.326272516 2.706502587
##  [17,]      0.366388743    0.656549493 0.779839729
##  [18,]      1.439992967    2.520703490 1.951403313
##  [19,]      2.922589277    3.455226555 2.961638519
##  [20,]      0.224377602    0.141119255 0.215448121
##  [21,]      1.640702046    0.744482469 0.343531513
##  [22,]      0.529228185    0.809710924 0.464398939
##  [23,]      0.336093033    0.211365284 0.523415231
##  [24,]      1.364064344    1.508408035 1.700133076
##  [25,]      1.536560543    0.706850668 0.290700335
##  [26,]      0.129703509    0.565104216 0.821846958
##  [27,]      0.902622811    0.873810426 0.725204559
```

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##  [28,]      0.036922897    0.391997930 0.050511760
##  [29,]      0.570884786    0.522454841 0.001030852
##  [30,]      1.442643842    1.370550203 1.489839217
##  [31,]      2.062948505    0.586428903 0.518003257
##  [32,]      0.089940389    0.388234750 0.408990631
##  [33,]      2.540105937    2.289895108 2.531257704
##  [34,]      1.142716313    0.970900473 0.868235309
##  [35,]      0.423193199    0.070873226 0.009535383
##  [36,]      1.835730679    0.770824730 0.155400977
##  [37,]      0.406151863    0.388234750 0.745306178
##  [38,]      0.222484121    0.418340191 0.682424191
##  [39,]      0.451595428    0.473533500 0.124990836
##  [40,]      0.033135933    0.302936000 0.016235923
##  [41,]      0.046390306    0.158680762 0.240446288
##  [42,]      0.884824081    0.433392911 0.042007229
##  [43,]      0.835972249    0.699324307 0.250754810
##  [44,]      1.249508690    0.846088332 0.865142752
##  [45,]      0.985936013    0.735576276 0.773396902
##  [46,]      0.320945178    0.063346866 0.641447814
##  [47,]      1.706973912    1.529732722 0.279103247
##  [48,]      0.311477769    1.160941070 1.356086137
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##  [50,]      0.506506402    0.006899164 0.336573260
##  [51,]      0.487571583    0.029478244 0.231168617
##  [52,]      2.750282426    1.865910147 1.567410849
##  [53,]      0.548163003    0.092197913 0.299720292
##  [54,]      1.296088345    0.779605483 0.006442827
##  [55,]      1.031000882    0.111013814 0.039945525
##  [56,]      0.059644679    0.649901208 0.521095813
##  [57,]      0.199762338    0.588937690 0.762572953
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##  [59,]      1.118101048    1.702839008 2.616303015
##  [60,]      0.095620835    0.682139118 0.288896344
##  [61,]      0.175147074    0.360638096 0.331934425
##  [62,]      0.360708297    0.486077433 0.557948781
##  [63,]      0.608754423    0.723659539 0.681135625
##  [64,]      1.315401860    1.163700735 1.337530797
##  [65,]      0.106981726    0.238961938 0.094322981
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##  [72,]      0.353134370    0.713498952 0.691959574
##  [73,]      0.514080330    0.157426369 0.325749312
##  [74,]      0.839948560    1.071502822 0.886275224
##  [75,]      0.885202777    0.531235595 1.562256588
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##  [77,]      1.534477713    1.597720843 1.476438138
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##  [85,]      0.603073978    0.857377873 0.513364421
##  [86,]      0.313371251    0.777096697 1.021059155
##  [87,]      0.237631976    0.598972837 0.293792892
##  [88,]      0.008520668    0.044530965 0.036079829
##  [89,]      1.243070852    0.230181185 0.064428266
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##  [91,]      1.315023163    1.535879250 1.492416348
##  [92,]      0.995024726    1.133344415 0.286576926
##  [93,]      3.390279300    2.085428988 1.325160570
##  [94,]      2.371586050    2.101736102 0.863854187
##  [95,]      0.190294929    0.059583685 0.139422767
##  [96,]      0.326625624    1.133344415 0.876739840
##  [97,]      1.152183722    0.433392911 0.186841971
##  [98,]      0.444021500    0.671727653 0.066489970
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## [100,]      0.197868856    0.501130154 0.478315445
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## [101,]      0.364495261    2.116788822 1.886975047
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## [109,]      1.193840323    1.172230610 1.644724768
## [110,]      1.481649568    0.999124324 1.567410849
## [111,]      0.786741720    0.716885815 1.183418385
## [112,]      0.561417376    0.043276571 0.224210365
## [113,]      1.078337929    0.906299214 0.145865594
## [114,]      0.262247240    0.402033077 0.267763872
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## [129,]      0.035029415    0.031987031 0.001030852
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## [134,]      0.878196894    0.959485494 1.106362179
## [135,]      0.315264732    0.659810916 0.173956317
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## [173,]      0.173253592    0.531235595 0.611810811
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## [173,]      0.175253592    0.551253595 0.611610611
## [174,]      0.366388743    0.462243959 0.513106708
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## [190,]      1.243260200    1.484700000 1.367167799
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```

```
matabsdev.all <- rbind(matabsdevsurv,matabsdevnosurv)
matabsdev.all <- data.frame(cancer$diagnosis, matabsdev.all)

t.test(matabsdev.all$radius_mean[cancer$diagnosis == "B"],matabsdev.all$radius_mean[cancer$diagnosis == "M"]
, alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$radius_mean[cancer$diagnosis == "B"] and matabsdev.all$radius_mean[cancer$diagnosis
== "M"]
## t = 0.32562, df = 567, p-value = 0.6276
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##        -Inf 0.07485419
## sample estimates:
## mean of x mean of y
## 0.5301158 0.5177632
```

```
t.test(matabsdev.all$texture_mean[cancer$diagnosis == "B"],matabsdev.all$texture_mean[cancer$diagnosis == "M
"], alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$texture_mean[cancer$diagnosis == "B"] and matabsdev.all$texture_mean[cancer$diagnosi
s == "M"]
## t = -2.1618, df = 567, p-value = 0.01553
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##         -Inf -0.02723094
## sample estimates:
## mean of x mean of y
## 0.6364762 0.7509490
```

```
t.test(matabsdev.all$perimeter_mean[cancer$diagnosis == "B"],matabsdev.all$perimeter_mean[cancer$diagnosis =
= "M"], alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$perimeter_mean[cancer$diagnosis == "B"] and matabsdev.all$perimeter_mean[cancer$diag
nosis == "M"]
## t = 0.2439, df = 567, p-value = 0.5963
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##        -Inf 0.07148672
## sample estimates:
## mean of x mean of y
## 0.5125724 0.5033541
```

```
t.test(matabsdev.all$area_mean[cancer$diagnosis == "B"],matabsdev.all$area_mean[cancer$diagnosis == "M"], al
ternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$area_mean[cancer$diagnosis == "B"] and matabsdev.all$area_mean[cancer$diagnosis == "
M"]
## t = 0.40112, df = 567, p-value = 0.6558
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##       -Inf 0.0909786
## sample estimates:
## mean of x mean of y
## 0.4981297 0.4803166
```

```
t.test(matabsdev.all$smoothness_mean[cancer$diagnosis == "B"],matabsdev.all$smoothness_mean[cancer$diagnosis
== "M"], alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$smoothness_mean[cancer$diagnosis == "B"] and matabsdev.all$smoothness_mean[cancer$di
agnosis == "M"]
## t = 1.6742, df = 567, p-value = 0.9527
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.167207
## sample estimates:
## mean of x mean of y
## 0.7680704 0.6837950
```

```
t.test(matabsdev.all$compactness_mean[cancer$diagnosis == "B"],matabsdev.all$compactness_mean[cancer$diagnos
is == "M"], alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$compactness_mean[cancer$diagnosis == "B"] and matabsdev.all$compactness_mean[cancer$
diagnosis == "M"]
## t = 1.8406, df = 567, p-value = 0.9669
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##       -Inf 0.1710355
## sample estimates:
## mean of x mean of y
## 0.6249227 0.5346711
```

```
t.test(matabsdev.all$concavity_mean[cancer$diagnosis == "B"],matabsdev.all$concavity_mean[cancer$diagnosis =
= "M"], alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$concavity_mean[cancer$diagnosis == "B"] and matabsdev.all$concavity_mean[cancer$diag
nosis == "M"]
## t = 1.0995, df = 567, p-value = 0.864
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##       -Inf 0.1302286
## sample estimates:
## mean of x mean of y
## 0.4977532 0.4456302
```

```
t.test(matabsdev.all$points_mean[cancer$diagnosis == "B"],matabsdev.all$points_mean[cancer$diagnosis == "M"]
, alternative="less",var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  matabsdev.all$points_mean[cancer$diagnosis == "B"] and matabsdev.all$points_mean[cancer$diagnosis
== "M"]
## t = 0.31387, df = 567, p-value = 0.6231
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##        -Inf 0.07740908
## sample estimates:
## mean of x mean of y
## 0.4434506 0.4310634
```

```
matstand
```

```
##         radius_mean  texture_mean perimeter_mean    area_mean
##   [1,] -0.512845261 -1.604183e+00    -0.53990056 -0.542146756
##   [2,] -1.000920224 -7.896900e-02    -0.93374423 -0.876603348
##   [3,] -0.876063838 -5.718735e-01    -0.86625169 -0.800448406
##   [4,] -0.807960355 -1.371681e+00    -0.78065139 -0.767485819
##   [5,]  0.301558892 -1.413531e+00     0.23379444  0.161718134
##   [6,] -0.725668646 -5.804381e-02    -0.73126661 -0.696729922
##   [7,] -0.742694517  1.078892e+00    -0.71809733 -0.714347856
##   [8,] -0.090036136  1.037041e+00    -0.01683336 -0.162224529
##   [9,] -1.032134320  8.172307e-05    -1.01070219 -0.905871851
##  [10,] -0.870388548 -1.006653e+00    -0.84279392 -0.798459284
##  [11,]  1.833887264  4.534609e-01     1.88612710  1.889980655
##  [12,] -0.532708777 -3.137962e-01    -0.56376987 -0.552944845
##  [13,] -0.280158360  3.372098e-01    -0.24647261 -0.335278109
##  [14,] -0.305697166  4.731766e-03    -0.38516156 -0.362841651
##  [15,]  1.550122751  1.327669e+00     1.47047181  1.523413958
##  [16,]  0.131300184  7.882640e-01     0.18194041  0.006282488
##  [17,]  0.449116439 -1.246130e+00     0.41281429  0.303514089
##  [18,] -0.413527681 -4.625975e-01    -0.44113098 -0.468833417
##  [19,]  1.692005007  1.062616e+00     1.75854973  1.682543687
##  [20,] -0.549734648 -1.394931e+00    -0.53043514 -0.565732056
```

```
##  [21,] -0.685941614 -4.881728e-01    -0.71151269 -0.666608937
##  [22,] -0.691616904  1.197468e+00    -0.64196245 -0.706107209
##  [23,] -0.904440289 -1.626698e-01    -0.88806330 -0.809541533
##  [24,]  0.276020086 -6.741745e-01     0.31322164  0.055726368
##  [25,] -1.026459030  2.093336e-01    -0.96008279 -0.911270896
##  [26,] -0.092873781 -8.136758e-01    -0.06333736 -0.201154480
##  [27,] -0.192191361 -2.300954e-01    -0.22095714 -0.283560947
##  [28,]  0.332772989  1.390444e+00     0.42927589  0.220255141
##  [29,] -1.282982150 -5.695485e-01    -1.24816071 -1.063864939
##  [30,] -0.206379587 -5.439733e-01    -0.26704961 -0.291233273
##  [31,] -0.305697166 -1.267055e+00    -0.38104616 -0.353180203
##  [32,] -0.385151230  7.394385e-01    -0.42178861 -0.422231139
##  [33,]  0.985431369  9.393903e-01     1.11243210  0.925256673
##  [34,] -0.527033487 -3.184462e-01    -0.55800831 -0.536463552
##  [35,]  0.128462539 -1.308905e+00     0.09551703  0.011113212
##  [36,] -0.132600813 -9.624771e-01    -0.15222998 -0.211100088
##  [37,]  1.365675817  4.697360e-01     1.30174045  1.350076217
##  [38,] -0.632026357 -1.078728e+00    -0.57035451 -0.631088909
##  [39,]  0.752744468 -1.138443e-01     0.71323841  0.657577736
##  [40,]  0.599511631 -1.208194e-01     0.69266142  0.426839629
##  [41,]  1.754433200  1.806623e+00     1.68447255  1.799049381
##  [42,]  1.550122751 -2.649707e-01     1.59393378  1.588770811
##  [43,] -0.768233323  2.535091e-01    -0.59216612 -0.763791736
##  [44,] -0.322723037 -1.176379e+00    -0.32466519 -0.399498321
##  [45,] -0.064497330 -6.206990e-01    -0.12342219 -0.157677965
##  [46,]  1.121638336  5.929622e-01     1.04658572  1.048866373
##  [47,] -0.850525032 -6.206990e-01    -0.88477099 -0.777999748
##  [48,]  3.292436862 -4.253972e-01     3.38413230  3.850686244
##  [49,] -0.175165490 -9.291913e-02    -0.15922616 -0.275036140
##  [50,] -0.473118229  1.395830e-01    -0.47487725 -0.521687220
##  [51,] -0.075847910 -5.486233e-01    -0.04152575 -0.215930812
##  [52,]  0.247643635 -8.787763e-01     0.22556364  0.084142391
##  [53,] -0.660402808 -4.718976e-01    -0.68764338 -0.633646351
##  [54,]  0.026307314  1.990300e+00     0.02390909 -0.088058708
##  [55,]  2.600051450  1.715947e+00     2.75447627  2.927165495
##  [56,] -0.223405457 -7.974006e-01    -0.22548408 -0.383301188
##  [57,] -0.677428679 -1.069428e+00    -0.64443169 -0.650411804
##  [58,] -1.148477771 -9.717772e-01    -1.16091425 -0.958725654
##  [59,]  2.872465383  2.116587e-01     3.05490039  3.143127271
##  [60,]  1.496207493 -2.579956e-01     1.44989481  1.392700252
##  [61,]  1.402565204  1.283494e+00     1.49516420  1.276194557
##  [62,]  0.948541983  1.253268e+00     0.99308554  0.936907242
##  [63,]  0.934353757  1.457870e+00     0.92723915  0.832904598
##  [64,] -0.195029006  5.325116e-01    -0.23824182 -0.261112289
##  [65,]  0.344123569 -1.169404e+00     0.43339128  0.140690277
##  [66,] -0.507169971  6.813130e-01    -0.49874657 -0.541010116
##  [67,] -0.243268973 -5.276981e-01    -0.30532282 -0.308282887
##  [68,]  0.136975474 -8.369260e-01     0.02925911  0.028446986
##  [69,] -0.078685556 -9.555021e-01    -0.12259911 -0.191777192
##  [70,] -0.697292195  1.698083e-01    -0.68970108 -0.678259507
##  [71,] -0.183678426  3.558100e-01    -0.14687996 -0.271910377
##  [72,] -1.156990706 -4.091220e-01    -1.13416416 -0.977764390
##  [73,] -1.443025336 -9.059411e-02    -1.31277247 -1.166162622
##  [74,]  1.056372498 -1.408881e+00     0.93135455  0.958219260
##  [75,]  0.769770339  3.960709e-02     0.67619982  0.640243962
##  [76,] -0.501494680  5.836621e-01    -0.50162735 -0.536463552
##  [77,]  1.186904174 -1.649948e-01     1.09597051  1.097173612
##  [78,] -0.799447419 -5.804381e-02    -0.83003618 -0.741058918
##  [79,] -0.387988875 -1.376331e+00    -0.39833083 -0.428482664
##  [80,]  1.096099529  3.186096e-01     1.06304732  0.957082619
##  [81,]  0.239130699 -5.439733e-01     0.17494423  0.088120634
##  [82,] -0.518520551 -7.881005e-01    -0.54072364 -0.543283397
##  [83,] -0.234756038  5.301866e-01    -0.27692657 -0.309135368
##  [84,]  0.145488410 -9.415519e-01     0.15642494 -0.008493844
##  [85,] -0.810798000 -1.471657e+00    -0.77406675 -0.763223416
##  [86,] -0.351099488 -1.434456e+00    -0.41479243 -0.394951757
##  [87,] -0.507169971 -1.632083e+00    -0.53619670 -0.529643706
##  [88,] -0.212054877  2.657581e+00    -0.23165718 -0.277593582
##  [89,]  1.995633037  8.719647e-01     1.86143471  2.128675248
##  [90,] -0.118412587 -1.417446e-01    -0.13329914 -0.238379470
##  [91,] -0.373800649 -1.448407e+00    -0.43948482 -0.415127134
##  [92,] -0.470280584 -4.602725e-01    -0.47405417 -0.496681120
##  [93,]  0.420739988  2.100692e-02     0.33050631  0.294705122
```

```
##  [94,] -0.319885392  1.357894e+00    -0.38516156 -0.382732867
##  [95,]  0.026307314  8.905649e-01     0.09880935 -0.127841141
##  [96,]  0.539921083 -8.787763e-01     0.56919945  0.393024562
##  [97,] -0.331235972 -2.324204e-01    -0.32054980 -0.368524856
##  [98,] -0.646214582 -4.253972e-01    -0.67612026 -0.631373069
##  [99,] -1.120101319 -4.091220e-01    -1.10494483 -0.971228704
## [100,]  3.147716961  1.306744e+00     3.27301653  3.475594740
## [101,] -0.969706127  2.558341e-01    -0.92469035 -0.880865751
## [102,] -1.250632996 -2.486956e-01    -1.28561084 -1.042268762
## [103,] -0.805122710 -1.453057e+00    -0.81233996 -0.758392692
## [104,]  0.156838990  1.953835e-01     0.11403633  0.084142391
## [105,] -0.263132489 -4.323722e-01    -0.32260749 -0.321922578
## [106,] -0.748369807 -1.092678e+00    -0.73990894 -0.710369613
## [107,] -0.444741778 -5.106875e-02    -0.41355781 -0.480483986
## [108,] -0.541221712  1.744583e-01    -0.51438508 -0.573404382
## [109,] -0.938492031  1.143992e+00    -0.94979429 -0.833410993
## [110,] -0.842012096  4.929862e-01    -0.86501707 -0.780273029
## [111,] -0.705805130 -2.231203e-01    -0.69134724 -0.688773435
## [112,] -1.676563530  3.279097e-01    -1.59261960 -1.281531676
## [113,]  1.286221753 -5.044479e-01     1.21120168  1.199471295
## [114,] -0.112737297  7.719888e-01     0.06712078 -0.217635773
## [115,] -0.671753388  5.371617e-01    -0.70986653 -0.645012760
## [116,]  0.891789080  1.425320e+00     0.84081578  0.778345834
## [117,]  0.091573152  2.163087e-01     0.10374783 -0.034636585
## [118,]  0.386688246  1.581832e-01     0.42927589  0.255206850
## [119,]  1.609713298  5.278616e-01     1.55277979  1.634236448
## [120,] -0.305697166 -1.626698e-01    -0.28309967 -0.406034006
## [121,] -0.078685556 -4.835227e-01    -0.14523380 -0.188083109
## [122,]  1.831049619  6.627128e-01     1.75854973  1.804732586
## [123,] -0.717155711  1.209093e+00    -0.73003199 -0.675417904
## [124,]  2.151703519 -4.742226e-01     2.01370446  2.532182775
## [125,] -0.754045097 -7.578752e-01    -0.77982831 -0.716621138
## [126,] -0.756882742 -2.626457e-01    -0.75637054 -0.715484497
## [127,] -0.288671295 -8.671512e-01    -0.19585321 -0.354316844
## [128,]  0.134137829  9.300903e-01     0.08234776  0.027878666
## [129,]  1.382701688 -8.826909e-02     1.29350966  1.372809036
## [130,]  0.040495540  7.580387e-01     0.07411696 -0.071293255
## [131,]  0.219267183  7.533886e-01     0.41692969  0.085563192
## [132,] -0.132600813 -3.711862e-02    -0.10325673 -0.226160580
## [133,] -0.260294844  2.039125e+00    -0.29174200 -0.331015705
## [134,]  2.109138842  7.208383e-01     2.05897385  2.341795421
## [135,] -0.870388548 -5.044479e-01    -0.85267087 -0.819487141
## [136,]  0.715855082  4.860112e-01     0.74204620  0.709579058
## [137,] -1.530424806 -5.695485e-01    -1.51031162 -1.195146966
## [138,] -0.586624034 -1.522807e+00    -0.62262007 -0.586191592
## [139,]  0.832198532  3.976604e-01     0.81612338  0.749361490
## [140,] -0.620675776 -2.440455e-01    -0.66912408 -0.617449218
## [141,]  1.272033528  2.232838e-01     1.24000947  1.247778534
## [142,]  1.096099529 -2.071512e+00     1.26881726  0.983509520
## [143,]  1.703355588  2.083301e+00     1.61451077  1.722326119
## [144,]  0.034820250  6.650378e-01     0.18317503 -0.026111778
## [145,]  0.128462539  5.208865e-01     0.22391748 -0.028669220
## [146,] -0.657565163 -4.416723e-01    -0.68723184 -0.642171158
## [147,]  0.468979955 -3.254213e-01     0.47866067  0.358357013
## [148,]  0.673290405 -2.324204e-01     0.60212264  0.520612505
## [149,] -0.481631164 -5.323482e-01    -0.55018905 -0.504637606
## [150,] -0.501494680 -1.742949e-01    -0.53331592 -0.534758590
## [151,] -0.464605294 -5.672235e-01    -0.52590820 -0.492418716
## [152,] -1.244390176 -3.944364e-02    -1.23622605 -1.037722198
## [153,] -0.348261843 -7.834505e-01    -0.33865755 -0.405465686
## [154,] -1.080374288 -6.834746e-01    -1.09712557 -0.937697797
## [155,]  0.080222572  1.023827e-01     0.16712498 -0.011051286
## [156,] -1.331222117 -2.254453e-01    -1.32306097 -1.069263984
## [157,] -0.152464329 -3.370464e-01    -0.23577258 -0.234685387
## [158,] -0.901602644  4.790361e-01    -0.82592078 -0.806415771
## [159,] -1.009433159 -2.254453e-01    -1.03498305 -0.892232160
## [160,] -0.180840780  6.999132e-01    -0.20819940 -0.266795493
## [161,] -0.243268973 -1.053153e+00    -0.29750356 -0.293222395
## [162,] -0.813635645  1.558582e-01    -0.75102052 -0.741058918
## [163,] -0.073010265 -7.160249e-01    -0.14194148 -0.173875098
## [164,] -1.454943445 -1.136854e+00    -1.46545377 -1.161047738
## [165,]  2.543298547  1.256329e-01     2.47462914  2.918640689
## [166,]  3.715245987  5.999372e-01     3.70924881  4.532670797
```

```
## [166,]  3.715245967  3.999572e-01     3.7092468  4.552670797
## [167,]  0.060359056 -1.353081e+00     0.02226293 -0.038898989
## [168,]  0.897464370  6.603878e-01     0.92312375  0.832336278
## [169,] -0.277320715 -9.183017e-01    -0.27404579 -0.329594904
## [170,] -0.109899652 -3.207712e-01    -0.15840308 -0.198597038
## [171,] -0.271645425 -1.463946e-01    -0.24647261 -0.341813794
## [172,] -0.041796169  7.680743e-02    -0.03494111 -0.157393805
## [173,] -0.118412587  3.581350e-01    -0.07280278 -0.218772414
## [174,] -0.152464329  5.929622e-01    -0.19791091 -0.266795493
## [175,] -0.197866651  7.913245e-02    -0.25223417 -0.254292443
## [176,] -0.359612424 -2.998460e-01    -0.36129224 -0.422231139
## [177,]  1.442292236 -1.673198e-01     1.37993303  1.412591468
## [178,] -0.870388548 -1.036878e+00    -0.89135562 -0.786240394
## [179,]  1.283384108 -3.928469e-01     1.30585585  1.196629693
## [180,] -0.552572293  2.860593e-01    -0.60698156 -0.557491409
## [181,] -0.538384067  6.285730e-02    -0.55265829 -0.550955724
## [182,]  0.551271664  8.378249e-02     0.49923767  0.462643818
## [183,] -0.101386717 -1.399581e+00    -0.16087232 -0.205132723
## [184,]  0.281695376 -6.067489e-01     0.28029845  0.175357825
## [185,] -0.824986226  1.326079e-01    -0.82427462 -0.760381813
## [186,] -0.912953225 -1.613483e+00    -0.93950579 -0.827443628
## [187,]  0.829360887 -4.874373e-02     0.88196977  0.682299676
## [188,]  1.226631206  6.092373e-01     1.16181689  1.193788091
## [189,]  1.711868523  8.610751e-02     1.61039537  1.759266949
## [190,] -1.244390176 -8.415760e-01    -1.25392227 -1.037153878
## [191,]  0.562622244 -2.882209e-01     0.54039166  0.449288287
## [192,] -0.623513421 -1.948286e+00    -0.65142787 -0.602957046
## [193,]  0.224942474 -1.013628e+00     0.18440965  0.090962237
## [194,]  0.117111959  1.918224e+00     0.19593277  0.011113212
## [195,]  0.446278794  2.372339e-01     0.37989110  0.317437940
## [196,]  1.411078139  1.627597e+00     1.52808739  1.355759422
## [197,]  0.270344796  1.499720e+00     0.24819833  0.175357825
## [198,]  0.139813120  1.099817e+00     0.10704015  0.022195461
## [199,] -0.189353716 -1.254694e-01    -0.18638779 -0.294927356
## [200,] -0.544059357 -1.208929e+00    -0.54278134 -0.548114121
## [201,]  0.244805990  1.374169e+00     0.14695952  0.124777304
## [202,] -0.944167321  6.255125e-01    -0.95390969 -0.838241716
## [203,]  0.244805990  6.557377e-01     0.22885596  0.110285132
## [204,] -0.424878262  3.418599e-01    -0.40409239 -0.495828639
## [205,] -0.685941614 -8.927265e-01    -0.69710880 -0.666608937
## [206,]  0.378175311  1.083542e+00     0.48689147  0.217129379
## [207,] -0.717155711 -2.161453e-01    -0.74443588 -0.688205115
## [208,] -0.671753388 -2.672957e-01    -0.69834341 -0.635919632
## [209,] -0.178003135 -1.529782e+00    -0.25840727 -0.252019161
## [210,]  1.975769521  1.692697e+00     2.08778165  1.864406234
## [211,] -0.351099488 -8.346009e-01    -0.32466519 -0.392962636
## [212,]  0.165351926  5.348366e-01     0.14737106  0.005714168
## [213,]  0.871925564  1.216068e+00     0.91489296  0.780050795
## [214,] -0.240431328 -1.294955e+00    -0.25429187 -0.321354258
## [215,] -0.921466160 -8.532011e-01    -0.88724022 -0.841083319
## [216,] -1.122938965 -1.025253e+00    -1.12840260 -0.974638627
## [217,] -0.390826520 -6.020988e-01    -0.38927696 -0.457751168
## [218,]  0.020632024  2.883844e-01     0.01814753 -0.103687521
## [219,] -0.475955874 -8.346009e-01    -0.38680772 -0.505205927
## [220,]  2.594376160  6.394626e-01     2.47462914  2.930007098
## [221,] -0.399339456 -1.281005e+00    -0.41931937 -0.462581892
## [222,] -0.405014746 -1.655333e+00    -0.45635796 -0.454341245
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## [226,] -1.569300544 -1.603448e-01    -1.55887333 -1.232371956
## [227,] -1.263118634 -1.429806e+00    -1.14609882 -1.086597758
## [228,]  1.717543814  5.820726e-02     1.72151114  1.691068494
## [229,]  0.968405498  7.056787e-03     0.95193155  0.843134366
## [230,] -0.816473290 -1.048503e+00    -0.84732086 -0.752709487
## [231,] -0.708642775  2.325103e+00    -0.70369343 -0.681385269
## [232,] -0.507169971 -1.008978e+00    -0.56294679 -0.527938745
## [233,]  0.037657895  8.378249e-02     0.24120216 -0.071009095
## [234,]  0.608024567  3.302348e-01     0.61446884  0.451277409
## [235,] -0.385151230  2.357653e+00    -0.43701558 -0.417684576
## [236,] -0.694454549 -7.253249e-01    -0.67817796 -0.666040617
## [237,]  0.207916603  9.114901e-01     0.34696791  0.046917401
## [238,] -1.576678421 -1.439106e+00    -1.54076557 -1.232087796
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## [239,] -0.986731998  1.378819e+00    -0.98600980 -0.874898386
## [240,] -1.034971965  1.326079e-01    -1.03909844 -0.901325288
## [241,] -0.047471459 -5.207231e-01    -0.02218337 -0.149153158
## [242,] -1.532694922 -8.043757e-01    -1.48685385 -1.204808414
## [243,] -1.342288933  5.557618e-01    -1.32594175 -1.097111686
## [244,]  0.914490241  8.766148e-01     0.78320019  0.790564724
## [245,]  1.589849783  1.233079e-01     1.59393378  1.566037992
## [246,] -1.261132283  1.170683e-02    -1.27244156 -1.049088607
## [247,] -1.162665996  4.627610e-01    -1.18437203 -0.987709998
## [248,]  0.097248443  1.325344e+00     0.15807110  0.004293366
## [249,] -1.683090114 -5.695485e-01    -1.65681982 -1.287214880
## [250,] -0.603649905  2.078651e+00    -0.62550085 -0.603525366
## [251,]  0.258994215 -5.927987e-01     0.27824075  0.098066242
## [252,]  0.434928213  9.091651e-01     0.75027700  0.337044996
## [253,] -0.810798000 -8.811014e-01    -0.76501288 -0.747026283
## [254,]  1.073398368  4.023104e-01     1.33466365  0.963618304
## [255,] -0.053146749 -1.422831e+00    -0.06827584 -0.172454297
## [256,] -1.340018817  5.604119e-01    -1.33211485 -1.090291841
## [257,]  0.114274313  1.170683e-02     0.09387087  0.013670654
## [258,] -0.785259194 -3.998219e-01    -0.80163993 -0.724861785
## [259,] -0.382313585 -6.509243e-01    -0.43619250 -0.433029228
## [260,] -0.166652555 -1.146154e+00    -0.18556471 -0.251735001
## [261,] -0.575273454 -3.649466e-01    -0.57200067 -0.593011438
## [262,] -1.088887223  1.934499e+00    -1.08231013 -0.947643405
## [263,]  0.378175311  4.425713e-02     0.40046809  0.267141579
## [264,] -0.064497330 -1.154338e-02    -0.13329914 -0.147732357
## [265,]  0.820847952  1.090517e+00     0.85727737  0.694518566
## [266,] -0.319885392  5.883121e-01    -0.18391855 -0.383869508
## [267,] -1.114426029 -4.207471e-01    -1.10782561 -0.948211726
## [268,] -1.486725071 -1.081053e+00    -1.36544958 -1.167583423
## [269,] -0.532708777  7.324634e-01    -0.56747373 -0.535326911
## [270,]  1.496207493  9.789157e-01     1.52808739  1.421116275
## [271,] -0.376638295 -4.253972e-01    -0.36705380 -0.416547935
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## [274,] -0.515682906 -6.439492e-01    -0.52590820 -0.522823861
## [275,]  1.433779300  7.440886e-01     1.46224101  1.401225059
## [276,]  3.967796404 -1.905700e-01     3.97263434  5.240229770
## [277,]  0.210754248  2.139837e-01     0.17082883  0.073912623
## [278,]  0.701666856  2.043775e+00     0.67208442  0.577444551
## [279,] -0.927141450  5.092614e-01    -0.96543280 -0.836536755
## [280,] -1.815608141  1.441595e+00    -1.81032420 -1.352855894
## [281,]  1.113125400 -7.299750e-01     1.16181689  0.997717532
## [282,] -0.813635645  1.256329e-01    -0.85061317 -0.758108532
## [283,] -0.586624034 -9.059411e-02    -0.63002779 -0.595568880
## [284,] -0.138276103 -8.578512e-01    -0.18885703 -0.226160580
## [285,]  0.869087919  6.464377e-01     0.80789259  0.776925033
## [286,]  0.145488410 -5.672235e-01     0.09222472  0.031572749
## [287,]  0.017794379  1.050991e+00     0.03707837 -0.125567859
## [288,]  1.635252105  2.256088e-01     1.58570298  1.588770811
## [289,]  1.933204844  9.928658e-01     1.93139649  2.015011156
## [290,] -0.419202972 -2.603207e-01    -0.38186924 -0.481052307
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## [293,] -0.101386717  6.975881e-01    -0.05510657 -0.187514789
## [294,] -0.544059357 -2.951960e-01    -0.56212371 -0.558343890
## [295,]  2.236832873  6.069123e-01     2.27297460  2.350320228
## [296,]  2.980295898  5.371617e-01     3.02609260  3.370455455
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## [299,] -0.583786389 -1.360056e+00    -0.58187763 -0.595853040
## [300,]  0.602349276  5.123219e-02     0.73381540  0.457244774
## [301,]  1.436616945 -7.788004e-01     1.41285622  1.426799479
## [302,]  0.037657895 -2.603207e-01    -0.03082571 -0.061915967
## [303,] -0.915790870 -1.471657e+00    -0.95802509 -0.818634661
## [304,] -0.206379587  2.860593e-01    -0.13700300 -0.279014383
## [305,]  0.460467020  2.232838e-01     0.43750668  0.302377448
## [306,]  1.811186103  1.981000e+00     1.74620354  1.887139053
## [307,]  0.310071828  2.634331e+00     0.47042987  0.176210306
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## [309,]  0.233455409 -1.208194e-01     0.24161370  0.098350403
## [310,] -0.160977264 -1.253105e+00    -0.13906070 -0.265943013
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## [312,]  0.900302015 -5.137480e-01     0.86550817  0.776640872
## [313,] -0.121250233 -3.835468e-01    -0.17321851 -0.238095310
## [314,] -0.634864002 -4.486474e-01    -0.64895863 -0.623132422
## [315,] -0.240431328  2.302588e-01    -0.19132627 -0.311692810
## [316,] -0.189353716  2.074001e+00    -0.25017647 -0.263669731
## [317,]  1.748757910 -1.150804e+00     1.77501133  1.824623802
## [318,]  2.577350289  1.785698e+00     2.53224473  2.884541461
## [319,] -0.850525032  7.324634e-01    -0.84279392 -0.785672074
## [320,]  0.179540151 -1.057803e+00     0.11938635  0.039245075
## [321,] -0.475955874 -6.695244e-01    -0.37528460 -0.506342567
## [322,]  0.741393888  5.348366e-01     0.74616160  0.609838817
## [323,]  1.740244975  8.696397e-01     1.66389556  1.730850926
## [324,] -0.623513421  5.208865e-01    -0.63537781 -0.614607615
## [325,] -0.484468810 -9.880524e-01    -0.54977751 -0.506910888
## [326,]  1.229468851 -1.789449e-01     1.19885548  1.193788091
## [327,] -0.027607943  4.557859e-01    -0.08967592 -0.146311556
## [328,]  0.468979955  8.417395e-01     0.56508405  0.362903577
## [329,] -0.319885392  3.465099e-01    -0.34812297 -0.385006149
## [330,]  2.662479643  1.157942e+00     2.59809111  3.103344838
## [331,] -1.245525234 -1.701834e+00    -1.26462230 -1.041132121
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## [333,] -0.944167321 -2.227289e+00    -0.95473277 -0.844777402
## [334,] -0.552572293 -1.211254e+00    -0.60574694 -0.549819083
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## [336,]  0.324260053 -1.483282e+00     0.25519451  0.200648086
## [337,] -0.450417068 -2.835709e-01    -0.51644278 -0.463150212
## [338,] -1.446714274 -4.556225e-01    -1.36544958 -1.149113008
## [339,]  1.317435850  4.976363e-01     1.27293266  1.242095330
## [340,]  0.454791729 -1.862260e+00     0.44573748  0.262310856
## [341,]  0.571135180 -1.029903e+00     0.50746846  0.412347457
## [342,]  1.388376978  1.232343e+00     1.23589407  1.196629693
## [343,]  0.605186921  6.022623e-01     0.63916123  0.488502399
## [344,] -0.802285065 -2.556706e-01    -0.74237818 -0.754414449
## [345,]  0.576810470  5.232115e-01     0.58566104  0.440195160
## [346,] -1.234458418 -5.346732e-01    -1.21276828 -1.036301397
## [347,] -1.489562716 -8.834264e-01    -1.44981526 -1.176108230
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## [349,]  0.261831860 -5.106875e-02     0.21774438  0.133586271
## [350,] -0.606487550  1.302094e+00    -0.59093150 -0.606935289
## [351,] -0.030445588 -8.439010e-01    -0.09790671 -0.137502588
## [352,]  0.976918434 -9.857273e-01     0.94781615  0.853079974
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## [354,] -0.790934484  4.581109e-01    -0.80205147 -0.734239072
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## [359,]  1.169878303  1.605082e-01     1.13712450  1.094332010
## [360,] -1.360449862  6.162124e-01    -1.35639570 -1.110751377
## [361,]  1.802673168  5.046114e-01     1.66801096  1.850198223
## [362,]  0.488843471  1.083542e+00     0.48277607  0.363187737
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## [368,] -1.240701238  2.071676e+00    -1.24651455 -1.034312275
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## [383,]  0.100086088  5.046114e-01     0.09387087 -0.019007772
## [384,]  0.568297535 -3.277463e-01     0.61858424  0.432806994
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## [384,]  0.568297535 -5.277465e-01     0.61858424  0.432806994
## [385,] -0.790934484 -1.580197e-01    -0.79052835 -0.749299564
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## [387,]  2.163054099  3.953354e-01     2.27708999  2.375894649
## [388,] -1.032134320 -1.580197e-01    -1.03333689 -0.910986735
## [389,] -0.146789039  1.323019e+00    -0.16128386 -0.205132723
## [390,]  0.616537502 -8.346009e-01     0.52393006  0.468611183
## [391,]  1.027996046  2.032150e+00     1.04247032  0.928382435
## [392,] -0.830661516  2.343703e+00    -0.87654019 -0.764075896
## [393,] -0.138276103 -6.857996e-01    -0.19585321 -0.236106188
## [394,]  1.428104010  1.699672e+00     1.40874083  1.372809036
## [395,] -0.126925523 -6.881246e-01    -0.17321851 -0.225592260
## [396,] -0.070172620 -7.276500e-01    -0.14811458 -0.165634451
## [397,] -0.714318065 -7.602003e-01    -0.67941258 -0.700992325
## [398,]  0.352636505  8.068641e-01     0.33873711  0.208320412
## [399,]  1.575661557  5.557618e-01     1.56101059  1.531938765
## [400,] -1.231620773  1.512081e-01    -1.22881833 -1.024082507
## [401,] -1.214594902 -8.392510e-01    -1.19219128 -1.027776590
## [402,] -0.214892522 -6.741745e-01    -0.24153414 -0.288107511
## [403,]  1.459318106  1.669447e+00     1.47870261  1.441007491
## [404,]  1.848075490 -4.509724e-01     1.76266513  1.932604689
## [405,] -0.251781909  1.953835e-01    -0.20984556 -0.318228495
## [406,]  1.791322587  5.790120e-01     1.72151114  1.813257393
## [407,]  0.579648115 -7.485752e-01     0.58977644  0.379669031
## [408,] -0.771070968 -1.969211e+00    -0.76665904 -0.714916176
## [409,]  0.210754248 -6.090739e-01     0.27453689  0.078459187
## [410,] -1.294048966 -7.857755e-01    -1.30701091 -1.066422381
## [411,] -0.351099488 -1.204279e+00    -0.28886122 -0.405465686
## [412,] -0.796609774  1.811273e+00    -0.83168234 -0.736512354
## [413,] -0.958355547 -1.004328e+00    -0.97572130 -0.851313087
## [414,] -0.685941614 -6.090739e-01    -0.70986653 -0.657231650
## [415,] -0.677428679 -1.225205e+00    -0.72962045 -0.646717721
## [416,]  1.507558074 -1.091943e-01     1.48693340  1.455215502
## [417,] -0.765395678 -9.066766e-01    -0.77818215 -0.724861785
## [418,]  0.083060217 -6.392991e-01     0.08975548 -0.038898989
## [419,]  1.723219104  1.753148e+00     1.71739574  1.645602857
## [420,] -0.660402808 -6.299991e-01    -0.53413900 -0.633362190
## [421,] -1.247511586 -9.183017e-01    -1.16009117 -1.007885374
## [422,]  0.276020086  6.348126e-01     0.21774438  0.164559736
## [423,] -0.844849742 -1.443757e+00    -0.86830939 -0.775726466
## [424,] -1.378894556 -1.492582e+00    -1.25433381 -1.154227893
## [425,] -0.771070968 -1.015953e+00    -0.75883978 -0.718610259
## [426,] -0.410690036  1.057966e+00    -0.38186924 -0.442974836
## [427,] -0.617838131 -1.006653e+00    -0.60657002 -0.648422683
## [428,]  0.207916603 -5.462983e-01     0.12020943  0.053453086
## [429,] -1.125776610  6.983236e-02    -1.12099488 -0.975206947
## [430,]  0.338448279 -4.695726e-01     0.46219908  0.165980537
## [431,] -0.146789039  1.255593e+00    -0.17321851 -0.233832907
## [432,]  1.186904174  3.000095e-01     1.18650928  1.128431238
## [433,] -0.603649905 -8.462260e-01    -0.61809314 -0.601252084
## [434,]  1.237981786 -4.114471e-01     1.20708628  1.173896874
## [435,] -0.895927354 -4.858477e-01    -0.83291696 -0.805279130
## [436,] -0.004906782 -1.490257e+00    -0.07979896 -0.109086565
## [437,]  1.328786430  1.605082e-01     1.19062468  1.270511353
## [438,] -0.345424198 -6.881246e-01    -0.38845388 -0.393530956
## [439,] -1.563341489 -1.743684e+00    -1.54858483 -1.222994668
## [440,] -0.674591034  2.070086e-01    -0.65307403 -0.668029738
## [441,] -0.325560682  1.403185e-02    -0.30655744 -0.400350802
## [442,] -0.143951394  9.161401e-01    -0.19667629 -0.232127945
## [443,]  0.264669505  1.256329e-01     0.34285251  0.144100200
## [444,] -0.186516071 -1.215904e+00    -0.19132627 -0.308567047
## [445,]  0.945704337  4.647799e+00     0.88196977  0.755044695
## [446,] -1.311926130 -1.592558e+00    -1.30166089 -1.082619515
## [447,] -0.107062007  1.041691e+00    -0.14111840 -0.184389026
## [448,] -0.595136970 -3.161212e-01    -0.65348557 -0.593579758
## [449,] -0.634864002 -2.184703e-01    -0.60286616 -0.632793870
## [450,]  0.837873822  1.827549e+00     0.79143099  0.784313199
## [451,] -1.046322546 -8.904015e-01    -1.04321384 -0.924342266
## [452,] -0.507169971  1.760123e+00    -0.44524638 -0.504353446
## [453,]  1.538772170  9.114901e-01     1.51985660  1.475106719
## [454,] -0.640539292  5.232115e-01    -0.62303161 -0.633362190
## [455,] -0.634864002  4.371857e-01    -0.64113937 -0.628247306
## [456,]  0.088735507 -9.555021e-01     0.08234776 -0.042024751
```

```
## [457,] -0.169490200 -1.941311e+00    -0.16704542 -0.271910377
## [458,]  1.873614296  2.750582e+00     1.79970372  2.171299283
## [459,] -1.548301970 -1.125229e+00    -1.54529251 -1.215322342
## [460,] -0.317047747  6.813130e-01    -0.40985395 -0.365114933
## [461,]  3.771998890  1.622947e+00     3.90678796  5.245912975
## [462,]  1.331624075  6.231874e-01     1.30585585  1.293244171
## [463,] -0.876063838 -1.013628e+00    -0.87654019 -0.801869207
## [464,] -0.098549072 -8.136758e-01    -0.14811458 -0.196039596
## [465,]  0.854899693 -6.718494e-01     0.98897014  0.732596037
## [466,] -0.490144100 -3.742467e-01    -0.43207711 -0.531632828
## [467,] -0.263132489 -8.067007e-01    -0.32507673 -0.334141468
## [468,]  1.107450110 -5.672235e-01     1.05070112  0.952251895
## [469,] -1.100237803 -7.229999e-01    -1.04732924 -0.939686919
## [470,] -0.024770298 -7.695003e-01    -0.09008746 -0.124147058
## [471,] -0.385151230  4.929862e-01    -0.40944241 -0.419105377
## [472,]  0.239130699  1.093577e-01     0.14531336  0.100339524
## [473,] -0.311372457 -2.021951e-01    -0.38516156 -0.372503099
## [474,]  1.533096880  3.064460e+00     1.48281801  1.614345231
## [475,] -0.592299325  2.057726e+00    -0.62220853 -0.582497509
## [476,]  1.161365367 -9.756917e-02     1.10008591  1.057391180
## [477,] -0.589461680  7.975640e-01    -0.54401596 -0.588464874
## [478,]  1.978607166  2.860593e-01     1.89847330  2.071843202
## [479,]  0.236293054 -4.409368e-02     0.20827896  0.092098878
## [480,] -0.087198491  1.209093e+00     0.01485522 -0.167623573
## [481,]  0.105761378 -1.952936e+00     0.09510549 -0.040319790
## [482,]  0.083060217  1.116827e-01     0.10333629 -0.035204906
## [483,]  1.277708818  1.353244e+00     1.35112524  1.230728920
## [484,] -1.198420325 -2.858959e-01    -1.12634490 -1.001633849
## [485,] -0.700129840 -5.160730e-01    -0.75184360 -0.664619816
## [486,]  0.460467020 -1.619343e-02     0.62269963  0.294705122
## [487,] -1.265672515 -1.859200e-01    -1.25433381 -1.039427160
## [488,]  2.310611646  8.843253e-02     2.50343693  2.427043490
## [489,] -0.274483070  2.907094e-01    -0.32548827 -0.330163225
## [490,] -0.864713257 -1.068693e-01    -0.76830520 -0.833410993
## [491,]  1.101774820  2.953594e-01     1.08773971  1.000559134
## [492,]  1.836724909  2.334403e+00     1.98078127  1.733692528
## [493,]  0.378175311 -1.720434e+00     0.43339128  0.233042352
## [494,] -0.898764999 -3.881968e-01    -0.87160171 -0.822044583
## [495,] -1.569016779  3.930103e-01    -1.53541555 -1.230666995
## [496,] -0.353937134 -2.486956e-01    -0.30943822 -0.459740290
## [497,] -1.206365731  2.565696e-02    -1.15309499 -1.013284418
## [498,] -0.271645425  5.859871e-01    -0.26951885 -0.350622761
## [499,]  1.538772170  2.204202e+00     1.71328034  1.568879595
## [500,]  0.398038827  3.317887e+00     0.48277607  0.255775170
## [501,]  0.727205662  2.116587e-01     0.62269963  0.576023750
## [502,]  0.537083438  9.184652e-01     0.44162208  0.406095932
## [503,]  0.568297535  3.232597e-01     0.66385362  0.408937534
## [504,] -1.009433159  2.163087e-01    -0.89794026 -0.899620326
## [505,] -0.711480420 -2.579956e-01    -0.64155091 -0.699287364
## [506,] -0.824986226  3.376013e+00    -0.87160171 -0.761802615
## [507,]  0.046170830 -5.741986e-01    -0.06868738 -0.063336768
## [508,]  0.193728377 -1.067103e+00     0.11074401  0.073344302
## [509,]  1.927529553  1.348594e+00     2.10012784  1.966703917
## [510,]  0.389525891  4.162605e-01     0.44985288  0.421156424
## [511,] -0.297184231 -8.322759e-01    -0.26087651 -0.383301188
## [512,]  1.079073659  1.206768e+00     0.95604695  0.977542155
## [513,] -0.649052227 -1.370945e-01    -0.57776223 -0.608924411
## [514,] -0.135438458 -1.425156e+00    -0.16828004 -0.244346835
## [515,]  0.630725728  9.300903e-01     0.70089221  0.527148190
## [516,] -0.368125359  7.068882e-01    -0.27610349 -0.431040106
## [517,]  1.828211974 -3.533215e-01     1.68447255  1.907030269
## [518,]  1.578499202  4.557859e-01     1.56512598  1.557513185
## [519,]  1.161365367 -1.370945e-01     1.16593229  1.074440794
## [520,] -0.288671295  7.557137e-01    -0.20367247 -0.356590126
## [521,] -1.034971965 -1.002002e+00    -1.00740987 -0.912975857
## [522,] -0.470280584 -1.603448e-01    -0.44771562 -0.491566235
## [523,]  0.284533021  2.446004e+00     0.19510969  0.183598472
## [524,] -1.806811442  1.220718e+00    -1.81279344 -1.346604368
## [525,] -2.027863997 -1.362381e+00    -1.98275941 -1.453164455
## [526,] -0.356774779 -7.160249e-01    -0.39462698 -0.405465686
## [527,] -0.427715907  1.088192e+00    -0.43701558 -0.450363002
## [528,]  1.084748949  1.674833e-01     0.91489296  0.929519076
## [529,] -0.782421549 -9.291913e-02    -0.81480920 -0.735659873
```

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## [530,] -1.265388750 -2.765958e-01    -1.27203002 -1.047383646
## [531,] -0.620675776  3.418599e-01    -0.58023147 -0.607787770
## [532,] -1.826391193  1.429970e+00    -1.79550876 -1.376725353
## [533,] -0.399339456 -3.765717e-01    -0.45224256 -0.436439151
## [534,]  0.661939824  1.907335e-01     0.71323841  0.505836173
## [535,]  1.606875653  1.355569e+00     1.58158758  1.526255560
## [536,] -0.368125359 -8.276259e-01    -0.37363844 -0.420526178
## [537,] -0.739856872 -1.254694e-01    -0.76665904 -0.698719043
## [538,] -0.688779259 -4.176866e-02    -0.72591659 -0.671155501
## [539,] -0.073010265  3.279097e-01    -0.09049900 -0.199165358
## [540,] -0.717155711 -1.499557e+00    -0.72550505 -0.688489275
## [541,]  0.818010306  2.256088e-01     0.72970001  0.708726577
## [542,] -1.371232914 -1.253105e+00    -1.31729941 -1.128369312
## [543,] -0.439066487 -2.068452e-01    -0.49956965 -0.471390859
## [544,]  1.762946136  5.162365e-01     1.80793452  1.730850926
## [545,]  1.717543814  1.088192e+00     2.12893563  1.676860482
## [546,] -0.334073618 -7.602003e-01    -0.36334994 -0.401203282
## [547,] -1.469131671 -8.206508e-01    -1.36750728 -1.164173501
## [548,] -0.387988875 -1.045442e-01    -0.41561551 -0.449794682
## [549,] -0.021932653  1.827549e+00    -0.02424107 -0.154836363
## [550,] -0.589461680 -1.083378e+00    -0.57323529 -0.584202471
## [551,] -0.362450069  4.836862e-01    -0.38433848 -0.398930000
## [552,] -0.847687387 -1.213579e+00    -0.85308241 -0.768054140
## [553,] -0.473118229  1.104467e+00    -0.32919213 -0.508615849
## [554,] -0.674591034 -4.021470e-01    -0.66171636 -0.659220771
## [555,] -0.260294844  1.385794e+00    -0.32384211 -0.332436506
## [556,]  2.123327068  6.952631e-01     2.15774343  2.137200055
## [557,] -0.745532162 -1.952201e-01    -0.76912828 -0.703265607
## [558,]  0.159676636 -1.234505e+00     0.25725221  0.003440886
## [559,] -0.864713257 -1.064778e+00    -0.89547102 -0.801869207
## [560,]  0.190890732 -3.788968e-01     0.16095188  0.056578849
## [561,]  0.034820250  5.650619e-01     0.06835540 -0.062200127
## [562,] -0.546897003 -9.485270e-01    -0.57446991 -0.559764691
## [563,]  0.077384927  1.790348e+00     0.01156290 -0.024975137
## [564,] -0.359612424 -1.387956e+00    -0.37651922 -0.426493543
## [565,] -0.271645425 -2.486956e-01    -0.31643440 -0.334141468
## [566,] -1.097400158 -1.064778e+00    -1.06049852 -0.947075085
## [567,]  0.327097698  7.254884e-01     0.28606000  0.158308211
## [568,]  0.114274313 -1.234505e+00     0.07782082 -0.030374182
## [569,]  2.055223584 -9.741022e-01     2.03016606  2.077526407
##         smoothness_mean compactness_mean concavity_mean  points_mean
##    [1,]     0.457882546     -0.653837927   -0.613766097 -0.307171959
##    [2,]     0.036953503      0.196146087   -0.312711686 -0.579832380
##    [3,]     0.806286653     -0.498004369   -0.731804513 -0.621581896
##    [4,]     1.424881700      0.175317786   -0.532481406 -0.024718442
##    [5,]    -1.189571158     -0.662737292   -0.688277063 -0.575966684
##    [6,]    -0.775041374     -0.513530920   -0.425857969 -0.892696038
##    [7,]    -0.266655790     -0.042432629    0.280992699 -0.202798168
##    [8,]     2.555417474      1.371998332    0.840452144  1.104064774
##    [9,]     0.250973169     -0.351448872   -0.738201920 -0.951196903
##   [10,]     0.493433986     -0.253177162   -0.436896631 -0.399690949
##   [11,]     0.863168956      1.137206580    1.630719971  1.628253144
##   [12,]    -0.698250265     -0.711021080   -0.626560909 -0.659981142
##   [13,]    -0.683318660      0.086324138    0.247124077 -0.356137441
##   [14,]    -1.120601365     -1.258237342   -1.105212334 -1.153321259
##   [15,]     0.486323698     -0.106621665    0.962128302  1.074943198
##   [16,]    -0.826946476      0.542653271    0.176878048 -0.297894289
##   [17,]    -0.123739003     -0.184065074   -0.218883062  0.268301311
##   [18,]     0.457882546     -0.524513115   -0.713364931 -0.717708868
##   [19,]     0.827617517      1.504542064    1.749887342  2.038016914
##   [20,]     0.728073486     -0.175165709   -0.755763427 -0.517981244
##   [21,]     0.098101979     -0.812890405   -0.636094299 -0.425977681
##   [22,]     1.936822428      0.963006247   -0.547534126 -0.093012404
##   [23,]     0.287235637     -0.563140145   -0.493720651 -0.505095591
##   [24,]     1.325337669      1.445844126    0.313606926  0.938612987
##   [25,]     1.126249608      0.491529260   -0.301547585 -0.470046615
##   [26,]     0.308566501      0.447979177   -0.136845735  0.045637224
##   [27,]     0.415220819     -0.429649673   -0.615396808 -0.544267977
##   [28,]     0.841838093      1.237561119    0.997251316  0.994536722
##   [29,]    -0.821258245     -0.228372550   -0.057442634 -0.670031952
##   [30,]    -1.208057907     -0.897150348   -0.840309540 -0.881098950
##   [31,]    -0.912980959     -1.268462144   -1.056704942 -1.033175429
##   [32,]    -0.413127720     -0.884842716   -0.522948016 -0.563854170
```

```
##  [32,]  -0.415127720  -0.884842716  -0.522946016 -0.563854170
##  [33,]  -0.246746984   1.818860055   1.565491516  1.321574599
##  [34,]  -0.676208372  -0.739991353  -0.711107023 -0.576997536
##  [35,]   0.139341649  -0.287070488  -0.082530502 -0.139916181
##  [36,]  -0.972707377  -0.546477505  -0.580900990 -0.623901313
##  [37,]  -0.445835045  -0.027284774   0.240852111  0.788366272
##  [38,]   1.339558245   0.478274887  -0.648512793 -0.486797964
##  [39,]  -0.548223190  -0.237082566  -0.057442634  0.434010810
##  [40,]   0.728073486   1.436376716   1.329665561  1.072108354
##  [41,]   0.258794485   0.084430656   0.791530803  1.144525725
##  [42,]   1.112029032   1.178863181   2.032125852  2.053479698
##  [43,]   3.280666839   3.399917422   1.914212875  1.450431130
##  [44,]  -0.123739003  -0.088822935  -0.645000492 -0.720028286
##  [45,]  -1.996588834  -0.968534615  -0.834915649 -0.915632501
##  [46,]  -1.610500201  -0.339330588   0.269703158  0.228355786
##  [47,]  -1.055897746  -1.249716674  -0.942166283 -0.907643396
##  [48,]   1.318227381   2.498620049   3.110904155  3.669340602
##  [49,]   0.678301471   0.196146087  -0.037623219  0.126043700
##  [50,]  -0.842589109  -0.055687002  -0.257142060 -0.462057510
##  [51,]   0.443661971   0.896734381   0.128082146  0.182998287
##  [52,]  -0.899471412   0.099578511  -0.297909845 -0.286554914
##  [53,]  -0.390374799  -0.795659720  -0.756014306 -0.838576295
##  [54,]  -1.004703673  -0.008349956   0.269703158 -0.124711110
##  [55,]   1.261345078   1.970338605   3.305335129  2.914241328
##  [56,]   0.813396941   0.930817055   0.352493121  0.539930879
##  [57,]  -1.092871243  -0.146384784  -0.270187751 -0.580605519
##  [58,]  -0.262389617  -1.086687884  -1.093860074 -1.198756072
##  [59,]   3.437093173   3.452934915   4.239858194  3.924476535
##  [60,]   0.521875137   0.754723241   0.925750894  1.178286136
##  [61,]  -0.394640972   2.171047684   1.529114108  1.306369528
##  [62,]   0.607198592   1.059573823   1.594342564  1.427236955
##  [63,]   0.301456213   0.194252605   0.995996923  0.439422784
##  [64,]  -1.048076429  -0.833718706  -0.723776396 -0.737295061
##  [65,]   0.777845502   2.066906181   1.491482307  1.253538350
##  [66,]   0.344117940  -0.053793521  -0.440283493 -0.533444028
##  [67,]  -0.846855282  -1.030072776  -0.668081330 -0.627767009
##  [68,]  -1.434876090  -1.310118746  -0.932382014 -0.776982873
##  [69,]  -0.085343448  -0.519968759  -0.552049943 -0.304337115
##  [70,]   0.372559092  -0.185769207  -0.587047518 -0.704823215
##  [71,]   0.372559092   0.400642130   0.219527423  0.140991057
##  [72,]   0.308566501  -0.588512803  -0.798914559 -0.803269605
##  [73,]   0.236041564   1.758268635   1.363534182  0.004145421
##  [74,]  -1.278449757  -0.798499943  -0.556314880 -0.183985115
##  [75,]  -1.557884071  -0.608015666  -0.467880147 -0.546587394
##  [76,]  -0.614348868  -0.187283993  -0.359375120 -0.295574871
##  [77,]  -0.745178165  -0.372277172  -0.089178787  0.237633456
##  [78,]  -1.064430091  -1.085551795  -0.648638233 -0.686010162
##  [79,]  -0.598706234  -0.470738230  -0.605612540 -0.604057408
##  [80,]   0.514764850   0.493422742   0.392633709  1.013349776
##  [81,]   0.155695311  -0.482667166  -0.787499579 -0.286297201
##  [82,]  -1.106380790  -0.602335220  -0.631703922 -0.834452886
##  [83,]  -0.749444338  -0.768961625  -0.694423591 -0.636013827
##  [84,]   1.197352487   0.559694607   0.136235703  0.559774785
##  [85,]   1.943932716   0.127980740  -0.122921969  0.169597207
##  [86,]  -1.906288177  -1.269598234  -0.830399833 -0.958928295
##  [87,]  -0.450101217  -0.781458606  -0.742843175 -0.578543814
##  [88,]  -0.278032250  -0.569577984  -0.760279243 -0.419534854
##  [89,]  -0.147913982  -0.040539147   0.262176798  0.963868867
##  [90,]   0.199068067   0.050347983  -0.438401903 -0.285781775
##  [91,]  -0.637812818  -1.261077565  -0.998576353 -0.917951918
##  [92,]  -0.503428376  -0.530950954  -0.661182166 -0.650188046
##  [93,]  -1.277027699  -0.912298203  -0.585918564 -0.527001202
##  [94,]  -0.900893470  -1.015114269  -0.962612895 -0.806619875
##  [95,]   0.792066077   2.593294143   1.371060543  0.444834759
##  [96,]  -0.103119168   0.620286027   0.396396889  0.553847384
##  [97,]  -1.624720777  -0.480016291  -0.604985343 -0.775436594
##  [98,]  -0.898760383  -0.907375151  -0.776711796 -0.673124508
##  [99,]   0.692522047  -0.365839334  -0.892115987 -0.767189776
## [100,]   0.706742623   3.070451576   3.074526748  3.494095720
## [101,]   0.841838093   0.465020514  -0.054181212 -0.521846940
## [102,]  -1.909843321  -1.531845474  -1.113892736 -1.260710292
## [103,]   0.140763706  -0.535116614  -0.704333298 -0.550710803
## [104,]   0.164227657  -0.612370674  -0.186268834  0.094602706
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## [105,]    -1.721420692     -1.119066424   -0.569987768 -0.975937357
## [106,]     0.585867728     -0.417720737   -0.448060732 -0.753273271
## [107,]    -0.622881213     -0.010243437    0.178132442 -0.129092232
## [108,]     0.941382123      0.205613496   -0.088426151 -0.702503798
## [109,]    -1.026745565     -0.725600890   -0.919712641 -1.050416433
## [110,]     0.386779668     -0.843754160   -1.001561809 -0.983411036
## [111,]     1.268455366     -0.050006557   -0.227036619 -0.362580268
## [112,]    -0.164267644      0.495316224    0.543160914 -0.701988371
## [113,]     0.642750032      0.107152439    0.713758413  0.972373399
## [114,]     1.190242199      2.366076318    1.555456369  0.807437038
## [115,]    -0.710337754     -1.035374525   -0.906039753 -0.973360227
## [116,]    -0.927912564      0.124193776    0.396396889  0.217531837
## [117,]     0.167782800      0.307861518    0.366291448  0.280413825
## [118,]     1.396440548      0.981941066    1.258165139  1.087828851
## [119,]    -0.179910277      0.497209705    0.481695639  0.979073938
## [120,]     0.841838093      0.493422742    0.090701223  0.183256000
## [121,]    -0.605105493     -0.813837146   -0.935768876 -0.966659687
## [122,]    -0.388241713      0.576735944    0.943312401  1.203284303
## [123,]    -1.537264236     -0.898665134   -0.866275483 -0.922333040
## [124,]    -0.179199249     -0.354478443    0.351238728  0.920830786
## [125,]    -0.398196116     -0.861174193   -0.789381169 -0.662300560
## [126,]    -0.556755536     -0.518832670   -0.694423591 -0.873625271
## [127,]     3.088689066      1.366317887    1.483955946  1.213592825
## [128,]    -0.678341459     -0.719163052   -0.061456693  0.097695263
## [129,]    -1.008969846     -0.455590375    0.049055363  0.189441113
## [130,]     0.528985425      0.209400460    0.721284774  0.321390202
## [131,]     0.221109960      2.237319550    2.314364362  1.241941262
## [132,]    -0.411705663      0.196146087    0.097474948 -0.020595033
## [133,]    -0.686162775     -0.673530139   -0.739205434 -0.416700011
## [134,]     1.040926154      0.218867870    1.945572709  2.318924153
## [135,]     1.638190336      0.052241464   -0.604232707 -0.160790939
## [136,]     1.119139320      0.783125469    0.799057163  1.102518495
## [137,]     0.536095713     -0.569199287   -1.113892736 -1.260710292
## [138,]    -0.231104350     -0.983303774   -0.866526362 -0.754819549
## [139,]     1.104918745      0.023839236    0.777732476  1.299411275
## [140,]    -0.977684579     -1.076084386   -0.866526362 -0.913055370
## [141,]    -0.139381636      0.042774055    0.755153395  0.731669398
## [142,]     1.567087457      3.280628064    2.650541786  2.530248864
## [143,]     0.102368152     -0.017817365    0.692433726  1.262558307
## [144,]     0.607198592      1.826433983    1.564237123  0.969280842
## [145,]     0.642750032      1.561346520    0.673617825  1.002783540
## [146,]     0.308566501     -0.922523006   -0.818733974 -0.860481905
## [147,]     0.052596137      0.470700959    0.134730431  0.441742202
## [148,]     0.035531446     -0.372277172   -0.378567339 -0.014667633
## [149,]    -1.478248846     -1.321668985   -0.945553145 -0.822855798
## [150,]    -0.824102360     -0.685269726   -0.782356566 -0.765643498
## [151,]    -0.799927382     -1.249716674   -1.057783720 -1.095181192
## [152,]     0.792066077     -0.397839178   -1.001825232 -0.753788697
## [153,]    -0.681896603     -0.175165709   -0.499992617 -0.464892354
## [154,]    -0.143647809     -1.030072776   -0.986948126 -1.119096964
## [155,]    -0.625014299      1.197798000    0.594591043  0.440711350
## [156,]     0.322787076     -0.847919820   -0.773952131 -0.898365725
## [157,]    -1.200236590     -1.208438769   -0.863390379 -0.941661520
## [158,]     1.872829837      0.330583300    0.195693949  0.200265062
## [159,]    -1.062297005     -1.130806012   -0.863892136 -0.974391079
## [160,]    -0.628569443     -0.518075277   -0.517930443 -0.388609287
## [161,]    -1.621876662     -1.018522537   -0.704835056 -0.578286101
## [162,]    -1.149042517      0.260524471    0.049431681  0.179390304
## [163,]    -0.634968702     -0.935777379   -0.925482851 -0.722605416
## [164,]    -1.870736738     -1.385668673   -1.067718516 -1.171232316
## [165,]    -0.209062458      0.438511767    0.988470563  1.324151730
## [166,]     0.927161547      1.648446686    2.487470647  3.579141030
## [167,]     0.191957779     -0.532087043   -0.395877967 -0.074457063
## [168,]    -0.452945332      0.434724804    0.102492521  0.673941672
## [169,]    -0.179199249     -0.366596727    0.051815029 -0.363095694
## [170,]    -1.203080705     -0.768393581   -0.752502004 -0.918209631
## [171,]     1.382219972      0.355198565    0.423993544  0.630903590
## [172,]     0.685411759      0.169637341    0.298554206  0.404889234
## [173,]     1.602638897      1.139100062    0.060972100  0.281702390
## [174,]    -1.194548360     -0.411850943   -0.603103753 -0.708688911
## [175,]    -0.418104922     -0.785056221   -0.379069096 -0.374692781
## [176,]     0.211866585     -0.168159826   -0.626059152 -0.664104551
## [177,]     0.635639744      0.423363912    0.545669701  1.057160996
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## [178,]    -1.347419549     -1.072865467   -0.773701252 -1.073971407
## [179,]     0.962712987      1.216732819    1.362279789  1.339614513
## [180,]    -1.154019719     -1.211089644   -0.814970794 -0.804558170
## [181,]    -0.035571433     -0.444418832   -0.588678229 -0.202282742
## [182,]    -0.332781467     -0.380608493    0.111524153  0.449989020
## [183,]    -0.311450603     -0.797742550   -0.980550720 -0.766674350
## [184,]    -0.540401874     -0.160207202   -0.166825737 -0.209498708
## [185,]     0.642750032     -0.692086261   -1.051097803 -1.065286476
## [186,]    -0.794950180     -1.081764831   -0.958849714 -0.907901109
## [187,]     1.261345078      1.000875885    1.281998613  1.548362094
## [188,]    -0.146491924     -0.137296071    0.332422827  0.503851050
## [189,]    -1.149042517     -0.354099746    0.334931614  0.730380832
## [190,]    -0.425926238     -1.087823973   -0.975533146 -0.898108012
## [191,]     0.060417453      0.177211268    0.071132687  0.270878441
## [192,]    -0.543245989     -0.983114426   -0.786997822 -0.797857631
## [193,]    -1.093582271     -0.356939969   -0.419084245 -0.430616516
## [194,]     1.247124502      1.044425968    0.942058008  0.637088704
## [195,]    -0.027750117     -0.309602922   -0.286871183  0.076562792
## [196,]     1.787506382      1.415548416    1.315867234  2.525094603
## [197,]     0.429441395     -0.125935180    0.435283084  0.428083410
## [198,]    -0.470721052     -0.346147122   -0.724779910 -0.498652765
## [199,]     0.792066077      0.179104750   -0.586922078 -0.448398717
## [200,]    -1.086471984     -0.494406753   -0.256013106 -0.607665390
## [201,]    -0.177066162     -1.004132074   -0.813089204 -0.513600122
## [202,]    -0.593729033     -0.888250984   -0.660554970 -0.898881152
## [203,]    -0.797083266     -0.034858702   -0.253504319 -0.261814460
## [204,]     0.211155557      0.313541963    0.222036210  0.290980060
## [205,]     1.325337669     -0.597033471   -0.611382749 -0.423142837
## [206,]     1.559977170      1.565133484    1.432525818  0.935005004
## [207,]    -0.802060468     -0.867043987   -0.691538486 -0.802754179
## [208,]     0.236041564     -0.855872444   -0.777088114 -0.354848876
## [209,]    -1.606945057     -1.291373275   -1.079296566 -1.146826889
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## [211,]    -1.292670332     -0.161721988    0.284755879 -0.387063009
## [212,]     1.232903927      0.608925136    0.508037900  0.832692918
## [213,]     0.763624926      1.489394209    1.008540857  0.786562280
## [214,]    -0.905159642     -0.352016916   -0.477037219 -0.522620080
## [215,]     0.308566501      0.048454501   -0.472270524 -0.855843070
## [216,]     1.211573063     -0.449341885   -0.977916494 -0.928260441
## [217,]     1.147580472      0.139341631   -0.627188106 -0.488859668
## [218,]    -0.501295290      0.122300294   -0.478793369 -0.472623745
## [219,]     2.235454519      1.243241565    0.865540012  0.823930674
## [220,]    -0.851121454      0.192359123    0.546924094  1.239621845
## [221,]     0.022021899     -0.386478286   -0.952326869 -0.764870359
## [222,]    -0.605105493     -0.878594226   -0.817855899 -0.641683515
## [223,]     1.325337669      1.133419616    1.642009512  1.476202437
## [224,]     0.984043850     -0.202999892   -0.538000737 -0.685237022
## [225,]    -0.600128292     -1.161101722   -1.113892736 -1.260710292
## [226,]     0.784955789     -0.868558772   -1.113892736 -1.260710292
## [227,]     2.071917898      2.197556431    0.376326595  0.553074245
## [228,]     1.204462775      0.843716889    1.561728336  1.983897171
## [229,]    -0.474987225      0.292713663    0.185658802  0.669045123
## [230,]    -0.945688283     -1.131563405   -1.101678707 -1.184916880
## [231,]    -0.198397026     -0.352206264   -0.215747078 -0.740903044
## [232,]    -0.678341459     -1.110167060   -0.849341173 -0.731367661
## [233,]    -1.279160785      2.252467405    2.653050573  0.748936173
## [234,]     1.460433139      0.521824970    0.740100674  0.926758186
## [235,]    -0.967019147     -1.173977399   -0.863390379 -0.874398411
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## [237,]     0.571647153      1.773416490    1.014812824  1.027266281
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## [244,]    -0.692562034     -0.784677525   -0.751247611 -0.529578332
## [245,]     0.699632335      1.525370364    1.917976055  1.249414941
## [246,]    -0.814147957     -1.023256241   -0.820741004 -1.012919182
## [247,]    -1.080072724     -1.234947515   -1.082909219 -1.127756123
## [248,]    -0.568131996      0.353305083    0.151790181 -0.258206477
## [249,]    -0.736645819     -0.850381346   -0.914695068 -1.108221473
## [250,]    -0.852543512     -0.754381815   -0.605236222 -0.759458384
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## [250,]    -0.652543512    -0.754581815   -0.605256222 -0.759456384
## [251,]     0.175604117     0.607031654   -0.145375610  0.322163341
## [252,]     1.033815866     3.920624938    2.870060627  2.287998585
## [253,]    -0.903737585     0.133661185    0.149281394 -0.550195377
## [254,]     1.894160700     2.901931689    2.886367741  1.826692202
## [255,]     2.022145883    -0.128586055    0.153044574  0.444061620
## [256,]     0.571647153    -0.809482138   -0.857118412 -0.936764972
## [257,]    -0.887383923    -0.498761762   -0.007894096 -0.506899583
## [258,]    -0.553200392    -0.969670704   -0.764795059 -0.719512860
## [259,]     0.138630620    -0.984629211   -0.655662835 -0.522620080
## [260,]     0.101657123    -0.436466208   -0.277964990 -0.028584138
## [261,]     0.464992834    -0.128018010   -0.513916384 -0.403556645
## [262,]    -0.430903440    -0.525649204   -0.361382149 -0.555091926
## [263,]     0.912940971     0.340050710    0.725047954  0.823415248
## [264,]    -1.169662352    -0.967209178   -0.738201920 -0.727244252
## [265,]     1.659521200     0.856971262    1.917976055  1.839577855
## [266,]     2.199903080     1.682529360    1.218024551  1.149679986
## [267,]    -1.124867538    -0.857197881   -0.389606000 -0.984699602
## [268,]     0.104501238     0.923243128   -0.034361796 -0.520558375
## [269,]    -1.026745565    -0.991067050   -0.898889711 -0.935734120
## [270,]     0.450772259     0.974367138    1.456359292  1.029327985
## [271,]    -1.131977826    -0.291425496   -0.186896031 -0.208467856
## [272,]     0.073927000     2.678500827    1.476429586  1.620521752
## [273,]    -1.131266797    -0.960581991   -0.777589872 -0.422885124
## [274,]    -0.329937352    -0.682618852   -0.690911289 -0.675186213
## [275,]    -0.791395036     0.728214494    0.283501485  0.484522570
## [276,]     1.268455366     0.894840900    2.901420462  2.849813062
## [277,]    -0.034860404    -0.395566999   -0.257894696  0.015227083
## [278,]    -0.839744994    -0.038645666    0.046546577  0.105684368
## [279,]    -1.567838474    -1.175302836   -1.113892736 -1.260710292
## [280,]    -1.093582271    -1.052037166   -1.113892736 -1.260710292
## [281,]     0.720963198     2.087734482    0.998505710  1.522590788
## [282,]    -0.799927382    -1.140084073   -1.050332623 -1.114741613
## [283,]    -0.888805980    -0.878594226   -1.019687793 -1.041963444
## [284,]    -0.151469126    -0.720299141   -0.523700652 -0.299182854
## [285,]     0.063972597    -0.272490677    0.022713102  0.421382870
## [286,]    -0.707493639    -0.707423464   -0.462611695 -0.541433133
## [287,]    -0.123027974     0.497209705    0.284755879  0.404631521
## [288,]     0.521875137     0.504783633    0.656056318  1.169781605
## [289,]     0.308566501     1.065254268    2.288022101  2.115330833
## [290,]     0.799176365     0.550227198   -0.108245566  0.046925790
## [291,]    -1.075806552    -1.034427785   -1.113892736 -1.260710292
## [292,]    -0.948532398    -0.768772277   -0.793269789 -0.737295061
## [293,]     1.680852064     0.423363912    0.623442090  0.421125157
## [294,]    -0.287986653    -0.617104379   -0.562963165 -0.738325913
## [295,]     0.706742623     1.724185962    1.956862249  2.607562783
## [296,]     0.472103122     2.011995207    1.783755963  2.530248864
## [297,]     0.585867728     1.317087358    1.501517454  2.146256400
## [298,]     0.138630620    -0.031071738    0.741355068  1.187048380
## [299,]     0.969823275    -0.269839803   -0.639606600 -0.539629142
## [300,]     0.443661971     1.608683567    1.690930854  1.108703609
## [301,]    -0.669809113     0.268098398    0.382598562  1.230601888
## [302,]    -2.175768089    -0.987280086   -0.803430375 -0.906612543
## [303,]    -1.508112056    -1.271681064   -1.075131980 -1.090928926
## [304,]     1.012485002     0.805847251    0.698705693  0.845320859
## [305,]     0.436551683     0.304074554    0.324896467  0.404631521
## [306,]    -0.339180726     0.057921910    0.835434571  0.888616653
## [307,]     0.600088304     1.976019051    2.084810374  1.169266179
## [308,]     0.172760002    -0.302597039   -0.700444679 -0.644776071
## [309,]    -1.065141120     0.234015725    0.021333270 -0.342736362
## [310,]     0.621419168     0.281352772   -0.127939542 -0.113629449
## [311,]    -0.341313813     0.510464079    0.796548376  1.355077297
## [312,]     0.315676789    -0.004562992    0.474169279  0.891966923
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## [314,]     1.858609261    -0.610477192   -0.370162903  0.647397226
## [315,]     0.550316289     0.743362349    0.121308422  0.326286750
## [316,]    -1.506689998    -1.080818091   -0.954459338 -0.972844801
## [317,]     0.280125349     0.538866307    1.369806149  1.427236955
## [318,]    -0.090320650     1.209158891    1.332174348  1.927200297
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## [320,]    -0.541112902    -0.502548725   -0.535868268 -0.351498606
## [321,]    -0.086765506     0.885373490    0.822890637 -0.011832789
## [322,]    -0.018506742     0.554014162    0.577029535  0.290206921
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## [323,]  -0.396774058   0.510464079   0.723793560  0.977012234
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## [325,]  -1.215879223  -1.333219225  -0.981805113 -0.975164218
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## [327,]  -0.402462288  -0.660654462  -0.930500424 -0.772086325
## [328,]   1.360889109   1.341702622   1.561728336  1.182151832
## [329,]   1.218683351  -0.538714229  -0.720514973 -0.579059240
## [330,]   0.749404350   0.453659622   1.781247177  2.373043896
## [331,]  -0.274477106  -1.198971360  -1.113892736 -1.260710292
## [332,]  -0.355534388  -0.483045862  -0.888478246 -0.722089990
## [333,]  -0.029883203  -0.889576421  -0.796405772 -0.823113511
## [334,]  -1.352396751  -1.367491247  -0.973024360 -1.130539424
## [335,]   1.446212563   0.495316224   0.816618670  0.961807163
## [336,]  -1.033855853  -0.796038416  -0.374804158 -0.447110152
## [337,]  -1.564283330  -1.473904928  -1.098915279 -1.120282444
## [338,]   0.728073486   0.699812266   2.812358532 -0.133215642
## [339,]  -0.369754964   0.678983966   0.215764243  0.308762261
## [340,]   0.564536865   0.483955332   0.380089775  0.339945542
## [341,]  -0.100275053  -0.366028682  -0.423976379 -0.093785543
## [342,]  -0.431614469   0.307861518   0.727556741  0.870834452
## [343,]   1.431991988   0.453659622   1.142760948  0.796097664
## [344,]  -0.031305261   0.533185861   0.827908211 -0.525197210
## [345,]   0.315676789   0.455553104   0.194439556  0.185833130
## [346,]   0.521875137  -0.384395456  -0.570238647 -0.802496466
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## [349,]  -0.299363114  -0.347851256  -0.174853854 -0.143524164
## [350,]   0.472103122  -0.230266032  -0.431377300 -0.159244661
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## [353,]  -1.075806552  -0.872913780  -0.336796039 -0.656888585
## [354,]  -0.623592242  -0.730713292  -0.470012616 -0.771313185
## [355,]   1.481764003   0.824782070   0.475423672  1.066180953
## [356,]   0.571647153  -0.503874163  -0.841438494 -0.873109845
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## [359,]  -0.123027974   0.088217620   0.299808599  0.646366374
## [360,]  -0.281587394  -0.914381034  -0.612637143 -0.930322145
## [361,]  -0.910847873  -0.394998955   0.020329755  0.291237773
## [362,]  -0.878140548  -0.078408785   0.132723402  0.121662578
## [363,]  -1.377282758  -1.332272484  -1.113892736 -1.260710292
## [364,]   0.255950370  -0.547613594  -0.872672890 -0.753530984
## [365,]   0.578757441  -0.639447465  -0.801548785 -0.502776174
## [366,]   0.247418025   0.145022076  -0.268807918 -0.592202607
## [367,]   1.076477593   1.176969699   1.213006977  1.455585392
## [368,]  -1.174639553  -1.099752909  -0.920590716 -0.991915567
## [369,]  -0.738778906  -0.845458293  -0.942417161 -1.031165267
## [370,]   0.507654562   0.273778844   0.615915730  0.953302632
## [371,]   1.382219972   0.078750211  -0.370288342 -0.415669158
## [372,]  -1.361640125  -0.318691635  -0.362761982 -0.698895815
## [373,]  -0.940711082  -1.180036541  -1.016601986 -1.040752193
## [374,]  -0.390374799  -0.491566530  -0.748111627 -0.867182445
## [375,]  -0.748733309  -0.947516966  -0.741839660 -0.675186213
## [376,]  -1.609789172  -1.210142903  -1.023915099 -0.964597983
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## [378,]   0.557426577   0.480168369  -0.374804158 -0.518496671
## [379,]  -0.182754393  -1.242521443  -1.095239906 -1.174814528
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## [381,]  -0.676919401  -0.777103597  -0.945553145 -0.669774239
## [382,]   0.365448804  -0.688677994  -0.800921588 -0.777498299
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## [384,]   0.543206001   0.976260620   0.584555896  0.737081372
## [385,]   0.607198592  -0.366407378  -0.574252705 -0.592202607
## [386,]  -0.539690845  -0.448395144  -0.567228102 -0.632405844
## [387,]  -0.167111759   1.737440335   1.639500725  1.543207833
## [388,]   0.742294062  -0.711210428  -0.825758577 -0.801981040
## [389,]  -0.105252255  -0.364135200  -0.031978449 -0.103836352
## [390,]  -0.148625011  -0.704772590  -0.420714956 -0.084765586
## [391,]   0.256661399   0.512357560   1.016067217  0.876504139
## [392,]  -1.555039956  -1.301976774  -1.113892736 -1.260710292
## [393,]  -1.387237161  -0.828416956  -0.880951886 -0.816670684
## [394,]   0.401000243   0.775551541   1.295796940  1.229828748
## [395,]  -0.255279329  -0.601956524  -0.894123016 -0.776209734
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## [396,]    -1.855805133     -1.060936531   -0.857369290 -1.041473789
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## [399,]     0.114455641      0.559694607    1.223042124  1.581864792
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## [401,]    -0.102408139     -0.381555233   -0.821619079 -0.638075532
## [402,]    -1.792523571     -0.588702151   -0.098837616 -0.539113716
## [403,]    -0.167111759      1.279217721    0.964637089  0.696104995
## [404,]    -0.135115464      0.061708874    0.801565950  1.043502204
## [405,]    -0.961330917      0.340050710    0.153044574 -0.530609185
## [406,]    -0.345579985      0.165850377    0.115287334  0.745585903
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## [420,]     0.905830684      1.243241565    0.967145875  0.650232070
## [421,]     0.770735214      1.051999895    4.039155254  0.764141244
## [422,]    -0.412416691     -0.634903109   -0.454959895 -0.401494940
## [423,]     0.083881403     -1.007540342   -0.865271969 -0.800434761
## [424,]     4.766717009      2.263828296    0.106632019  0.092798715
## [425,]    -0.410283605     -0.431543155   -0.338552190 -0.652249750
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## [436,]    -0.232526408     -0.970996142   -0.892492305 -0.556380491
## [437,]    -0.506983520     -0.861552889   -0.107869248  0.245107135
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## [465,]     1.581308033      2.333887126    1.682150100  2.349849720
## [466,]     0.642750032      0.516144524   -0.142866823 -0.539371429
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## [468,]    -0.489918829      0.357092047    0.253396044  0.351027204
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## [472,]    -0.863919973    -0.962286125  -0.869662345 -0.761004663
## [473,]    -0.464321793    -1.262592351  -0.792517153 -0.507415009
## [474,]    -0.864631001     0.163956895   0.322387680  0.449731307
## [475,]    -0.628569443    -0.839588499  -0.816977824 -0.648126341
## [476,]     0.078193173     0.139341631   0.303571779  0.788108559
## [477,]    -1.920508753     0.056028428  -0.117528077 -0.493240790
## [478,]     0.034109388     0.249163580   0.858013652  1.715875585
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## [480,]     1.410661124     1.207265409   0.588319076  0.481172301
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## [486,]     1.986594443     2.500513531   2.541409563  1.940085950
## [487,]    -0.490629858    -0.790736667  -0.744097568 -0.870532715
## [488,]     2.576748338     3.265480209   4.234840621  3.437398846
## [489,]    -1.636097238    -0.976865935  -0.888101928 -0.937022685
## [490,]     1.794616670     2.102882337   1.004777677  0.380148780
## [491,]     0.265904773     0.465020514   0.353747514  0.739658503
## [492,]     1.524425730     3.269267173   3.294045588  2.656528265
## [493,]     2.086138474     0.968686693   1.435034605  1.566402009
## [494,]     0.036242474    -0.129154099  -0.453705502 -0.542206272
## [495,]     1.986594443    -0.278549819  -0.737574723 -1.022093767
## [496,]     1.808837246     1.169395772  -0.508647932  0.105942081
## [497,]     0.294345925    -0.139568250  -0.341939052 -0.480097424
## [498,]     0.055440252     0.006797899  -0.077889246  0.092798715
## [499,]    -0.267366818     1.930575486   1.123945047  1.687527148
## [500,]     0.706742623     1.127739170   1.082550066  0.903821724
## [501,]    -1.520910574    -0.629033315  -0.656164593 -0.666166256
## [502,]    -1.016791162    -0.712914562  -0.700068361 -0.404329784
## [503,]     1.467543427     1.852942729   1.046172658  1.388579995
## [504,]    -0.400329202     1.167502290   1.746124162  0.270363015
## [505,]     1.503094866     0.832355998   0.165588508  0.173205190
## [506,]    -1.319689426    -1.298947203  -1.051587017 -1.094897707
## [507,]    -2.280289321    -1.469171223  -1.022949216 -1.099639628
## [508,]    -0.827657504    -1.025907116  -0.685391958 -0.605861399
## [509,]     0.962712987     2.258147851   2.867551840  2.537980256
## [510,]     1.112029032     0.998982403   0.795293983  0.924954195
## [511,]     0.792066077     0.429044358  -0.540885842 -0.459222666
## [512,]    -0.555333478    -0.645127911  -0.399013951 -0.038119521
## [513,]     1.033815866     0.894840900   0.413958397  0.074758800
## [514,]     0.007090294    -0.326265563  -0.626184591 -0.600191712
## [515,]     0.075349058     0.858864744   1.157813669  1.000206409
## [516,]     0.884499820     1.430696271   1.012304037  0.507459033
## [517,]    -0.826235447    -0.486643478  -0.023824892  0.547662271
## [518,]     0.941382123     1.051999895   1.362279789  2.035439783
## [519,]     1.311117093     0.836142961   1.108892327  1.471048175
## [520,]     0.273015061     0.832355998  -0.021943302  0.054141755
## [521,]     0.127965188    -0.057580484  -0.319234532 -0.689102718
## [522,]     0.233908478     0.027626200  -0.109750838 -0.275988678
## [523,]    -0.935733880    -1.103729221  -0.526084000 -0.554834212
## [524,]    -3.109348889    -1.149740831  -1.113892736 -1.260710292
## [525,]     1.467543427    -0.542690541  -1.113892736 -1.260710292
## [526,]    -0.150047068    -0.798121246  -0.624679319 -0.844503695
## [527,]    -1.232232885    -0.550075120  -0.431753618 -0.736006496
## [528,]    -0.877429520    -0.702879108  -0.199063646  0.181452008
## [529,]    -0.656299566    -1.027421902  -0.812963765 -0.700699806
## [530,]    -0.942133139    -0.947895663  -0.928367955 -1.112035626
## [531,]    -0.733090675    -0.061367448  -0.289254530 -0.283720070
## [532,]    -0.688295862     0.294607145   0.046672016 -0.909189674
## [533,]    -1.237210087    -1.119445121  -0.938026784 -0.787806821
## [534,]     0.138630620     0.970580175   1.135234588  1.024173724
## [535,]     0.365448804     1.033065077   2.078538407  1.700412801
## [536,]    -0.423793152    -0.409957462  -0.381954201 -0.467469484
## [537,]    -0.079655218    -0.939374994  -0.733058907 -0.673639935
## [538,]    -0.584485658    -0.981031596  -0.915322264 -0.964855696
## [539,]    -0.041259664    -0.048113075  -0.651272459 -0.650188046
## [540,]    -0.464321793    -0.550832513  -0.587549275 -0.397371531
```

```
## [541,]    -0.614348868     -0.592678463   -0.242089339  0.128363117
## [542,]     2.896711293      0.343837673   -0.695928863 -0.636786967
## [543,]    -0.883828779     -1.177385666   -1.090561019 -1.185354992
## [544,]     1.467543427      1.574600893    2.103626274  2.615294175
## [545,]     2.292336822      4.564408776    3.595099999  2.873007238
## [546,]     0.294345925     -0.471684971   -0.341813613 -0.392217270
## [547,]    -0.123739003      0.377920347    0.048051849 -0.665908543
## [548,]     0.028421158     -0.469980837   -0.776711796 -0.801723327
## [549,]     0.208311441      0.156382968   -0.554182411 -0.151513269
## [550,]     0.479213410     -0.254123903   -0.286996622 -0.552257082
## [551,]    -1.482515019     -0.401058097   -0.345451353 -0.779560003
## [552,]    -1.679469994     -0.827470215   -0.548788520 -0.881614376
## [553,]     1.581308033      2.561104951    1.737343408  0.940932405
## [554,]     0.777845502     -0.136538679   -0.451322154 -0.116464292
## [555,]    -0.600839321     -0.990120309   -0.766174892 -0.727759678
## [556,]     1.446212563      1.976019051    2.410952652  2.764767751
## [557,]    -0.206929371     -0.841292633   -0.782983763 -0.727501965
## [558,]     0.479213410      1.500755100    0.704977660  0.362882005
## [559,]     0.301456213     -0.888250984   -0.817479581 -0.595037450
## [560,]    -0.324960150     -0.292372237   -0.603480071 -0.678278770
## [561,]     0.132942390      0.103365475    0.540652128  0.181967434
## [562,]    -0.684740718     -0.736393737   -0.863766697 -0.824659789
## [563,]    -1.877847026     -0.986712041   -0.677865598 -0.813062702
## [564,]     1.211573063     -0.302975736   -0.637223253 -0.384485878
## [565,]    -1.542952466     -0.840724589   -0.504382994 -0.521073801
## [566,]     0.174893088     -0.241437575   -0.664694468 -0.735748783
## [567,]    -0.411705663      0.016265309   -0.439656296 -0.419792568
## [568,]     0.962712987     -0.225721675   -0.248988503  0.413136052
## [569,]     0.265904773      0.892947418    1.309595267  1.973588648
## attr(,"scaled:center")
##      radius_mean     texture_mean   perimeter_mean        area_mean
##      14.12729174      19.28964851      91.96903339     654.88910369
##  smoothness_mean compactness_mean   concavity_mean      points_mean
##       0.09636028       0.10434098       0.08879932       0.04891915
## attr(,"scaled:scale")
##      radius_mean     texture_mean   perimeter_mean        area_mean
##       3.52404883       4.30103577      24.29898104     351.91412918
##  smoothness_mean compactness_mean   concavity_mean      points_mean
##       0.01406413       0.05281276       0.07971981       0.03880284
```

```
matstand.all <- data.frame(cancer$diagnosis, matstand)
matstand.all
```

```
##     cancer.diagnosis  radius_mean  texture_mean perimeter_mean
## 1                  B -0.512845261 -1.604183e+00    -0.53990056
## 2                  B -1.000920224 -7.896900e-02    -0.93374423
## 3                  B -0.876063838 -5.718735e-01    -0.86625169
## 4                  B -0.807960355 -1.371681e+00    -0.78065139
## 5                  B  0.301558892 -1.413531e+00     0.23379444
## 6                  B -0.725668646 -5.804381e-02    -0.73126661
## 7                  B -0.742694517  1.078892e+00    -0.71809733
## 8                  M -0.090036136  1.037041e+00    -0.01683336
## 9                  B -1.032134320  8.172307e-05    -1.01070219
## 10                 B -0.870388548 -1.006653e+00    -0.84279392
## 11                 M  1.833887264  4.534609e-01     1.88612710
## 12                 B -0.532708777 -3.137962e-01    -0.56376987
## 13                 B -0.280158360  3.372098e-01    -0.24647261
## 14                 B -0.305697166  4.731766e-03    -0.38516156
## 15                 M  1.550122751  1.327669e+00     1.47047181
## 16                 B  0.131300184  7.882640e-01     0.18194041
## 17                 B  0.449116439 -1.246130e+00     0.41281429
## 18                 B -0.413527681 -4.625975e-01    -0.44113098
## 19                 M  1.692005007  1.062616e+00     1.75854973
## 20                 B -0.549734648 -1.394931e+00    -0.53043514
## 21                 B -0.685941614 -4.881728e-01    -0.71151269
## 22                 B -0.691616904  1.197468e+00    -0.64196245
## 23                 B -0.904440289 -1.626698e-01    -0.88806330
## 24                 B  0.276020086 -6.741745e-01     0.31322164
## 25                 B -1.026459030  2.093336e-01    -0.96008279
## 26                 M -0.092873781 -8.136758e-01    -0.06333736
## 27                 B -0.192191361 -2.300954e-01    -0.22095714
## 28                 M  0.332772989  1.390444e+00     0.42927589
```

```
## 28                M  0.332772989  1.390444e+00     0.42927589
## 29                B -1.282982150 -5.695485e-01    -1.24816071
## 30                B -0.206379587 -5.439733e-01    -0.26704961
## 31                B -0.305697166 -1.267055e+00    -0.38104616
## 32                M -0.385151230  7.394385e-01    -0.42178861
## 33                M  0.985431369  9.393903e-01     1.11243210
## 34                B -0.527033487 -3.184462e-01    -0.55800831
## 35                B  0.128462539 -1.308905e+00     0.09551703
## 36                B -0.132600813 -9.624771e-01    -0.15222998
## 37                M  1.365675817  4.697360e-01     1.30174045
## 38                B -0.632026357 -1.078728e+00    -0.57035451
## 39                M  0.752744468 -1.138443e-01     0.71323841
## 40                M  0.599511631 -1.208194e-01     0.69266142
## 41                M  1.754433200  1.806623e+00     1.68447255
## 42                M  1.550122751 -2.649707e-01     1.59393378
## 43                M -0.768233323  2.535091e-01    -0.59216612
## 44                B -0.322723037 -1.176379e+00    -0.32466519
## 45                B -0.064497330 -6.206990e-01    -0.12342219
## 46                M  1.121638336  5.929622e-01     1.04658572
## 47                B -0.850525032 -6.206990e-01    -0.88477099
## 48                M  3.292436862 -4.253972e-01     3.38413230
## 49                B -0.175165490 -9.291913e-02    -0.15922616
## 50                B -0.473118229  1.395830e-01    -0.47487725
## 51                M -0.075847910 -5.486233e-01    -0.04152575
## 52                B  0.247643635 -8.787763e-01     0.22556364
## 53                B -0.660402808 -4.718976e-01    -0.68764338
## 54                B  0.026307314  1.990300e+00     0.02390909
## 55                M  2.600051450  1.715947e+00     2.75447627
## 56                B -0.223405457 -7.974006e-01    -0.22548408
## 57                B -0.677428679 -1.069428e+00    -0.64443169
## 58                B -1.148477771 -9.717772e-01    -1.16091425
## 59                M  2.872465383  2.116587e-01     3.05490039
## 60                M  1.496207493 -2.579956e-01     1.44989481
## 61                M  1.402565204  1.283494e+00     1.49516420
## 62                M  0.948541983  1.253268e+00     0.99308554
## 63                M  0.934353757  1.457870e+00     0.92723915
## 64                M -0.195029006  5.325116e-01    -0.23824182
## 65                M  0.344123569 -1.169404e+00     0.43339128
## 66                B -0.507169971  6.813130e-01    -0.49874657
## 67                B -0.243268973 -5.276981e-01    -0.30532282
## 68                B  0.136975474 -8.369260e-01     0.02925911
## 69                B -0.078685556 -9.555021e-01    -0.12259911
## 70                B -0.697292195  1.698083e-01    -0.68970108
## 71                M -0.183678426  3.558100e-01    -0.14687996
## 72                B -1.156990706 -4.091220e-01    -1.13416416
## 73                B -1.443025336 -9.059411e-02    -1.31277247
## 74                B  1.056372498 -1.408881e+00     0.93135455
## 75                B  0.769770339  3.960709e-02     0.67619982
## 76                B -0.501494680  5.836621e-01    -0.50162735
## 77                M  1.186904174 -1.649948e-01     1.09597051
## 78                B -0.799447419 -5.804381e-02    -0.83003618
## 79                B -0.387988875 -1.376331e+00    -0.39833083
## 80                M  1.096099529  3.186096e-01     1.06304732
## 81                B  0.239130699 -5.439733e-01     0.17494423
## 82                B -0.518520551 -7.881005e-01    -0.54072364
## 83                B -0.234756038  5.301866e-01    -0.27692657
## 84                B  0.145488410 -9.415519e-01     0.15642494
## 85                B -0.810798000 -1.471657e+00    -0.77406675
## 86                B -0.351099488 -1.434456e+00    -0.41479243
## 87                B -0.507169971 -1.632083e+00    -0.53619670
## 88                B -0.212054877  2.657581e+00    -0.23165718
## 89                M  1.995633037  8.719647e-01     1.86143471
## 90                B -0.118412587 -1.417446e-01    -0.13329914
## 91                B -0.373800649 -1.448407e+00    -0.43948482
## 92                B -0.470280584 -4.602725e-01    -0.47405417
## 93                M  0.420739988  2.100692e-02     0.33050631
## 94                B -0.319885392  1.357894e+00    -0.38516156
## 95                M  0.026307314  8.905649e-01     0.09880935
## 96                M  0.539921083 -8.787763e-01     0.56919945
## 97                B -0.331235972 -2.324204e-01    -0.32054980
## 98                B -0.646214582 -4.253972e-01    -0.67612026
## 99                B -1.120101319 -4.091220e-01    -1.10494483
## 100               M  3.147716961  1.306744e+00     3.27301653
```

```
## 101              B -0.969706127  2.558341e-01    -0.92469035
## 102              B -1.250632996 -2.486956e-01    -1.28561084
## 103              B -0.805122710 -1.453057e+00    -0.81233996
## 104              M  0.156838990  1.953835e-01     0.11403633
## 105              B -0.263132489 -4.323722e-01    -0.32260749
## 106              B -0.748369807 -1.092678e+00    -0.73990894
## 107              B -0.444741778 -5.106875e-02    -0.41355781
## 108              B -0.541221712  1.744583e-01    -0.51438508
## 109              B -0.938492031  1.143992e+00    -0.94979429
## 110              B -0.842012096  4.929862e-01    -0.86501707
## 111              B -0.705805130 -2.231203e-01    -0.69134724
## 112              B -1.676563530  3.279097e-01    -1.59261960
## 113              M  1.286221753 -5.044479e-01     1.21120168
## 114              M -0.112737297  7.719888e-01     0.06712078
## 115              B -0.671753388  5.371617e-01    -0.70986653
## 116              M  0.891789080  1.425320e+00     0.84081578
## 117              M  0.091573152  2.163087e-01     0.10374783
## 118              M  0.386688246  1.581832e-01     0.42927589
## 119              M  1.609713298  5.278616e-01     1.55277979
## 120              B -0.305697166 -1.626698e-01    -0.28309967
## 121              B -0.078685556 -4.835227e-01    -0.14523380
## 122              M  1.831049619  6.627128e-01     1.75854973
## 123              B -0.717155711  1.209093e+00    -0.73003199
## 124              M  2.151703519 -4.742226e-01     2.01370446
## 125              B -0.754045097 -7.578752e-01    -0.77982831
## 126              B -0.756882742 -2.626457e-01    -0.75637054
## 127              M -0.288671295 -8.671512e-01    -0.19585321
## 128              M  0.134137829  9.300903e-01     0.08234776
## 129              M  1.382701688 -8.826909e-02     1.29350966
## 130              M  0.040495540  7.580387e-01     0.07411696
## 131              M  0.219267183  7.533886e-01     0.41692969
## 132              B -0.132600813 -3.711862e-02    -0.10325673
## 133              B -0.260294844  2.039125e+00    -0.29174200
## 134              M  2.109138842  7.208383e-01     2.05897385
## 135              B -0.870388548 -5.044479e-01    -0.85267087
## 136              M  0.715855082  4.860112e-01     0.74204620
## 137              B -1.530424806 -5.695485e-01    -1.51031162
## 138              B -0.586624034 -1.522807e+00    -0.62262007
## 139              M  0.832198532  3.976604e-01     0.81612338
## 140              B -0.620675776 -2.440455e-01    -0.66912408
## 141              M  1.272033528  2.232838e-01     1.24000947
## 142              M  1.096099529 -2.071512e+00     1.26881726
## 143              M  1.703355588  2.083301e+00     1.61451077
## 144              M  0.034820250  6.650378e-01     0.18317503
## 145              M  0.128462539  5.208865e-01     0.22391748
## 146              B -0.657565163 -4.416723e-01    -0.68723184
## 147              M  0.468979955 -3.254213e-01     0.47866067
## 148              B  0.673290405 -2.324204e-01     0.60212264
## 149              B -0.481631164 -5.323482e-01    -0.55018905
## 150              B -0.501494680 -1.742949e-01    -0.53331592
## 151              B -0.464605294 -5.672235e-01    -0.52590820
## 152              B -1.244390176 -3.944364e-02    -1.23622605
## 153              B -0.348261843 -7.834505e-01    -0.33865755
## 154              B -1.080374288 -6.834746e-01    -1.09712557
## 155              B  0.080222572  1.023827e-01     0.16712498
## 156              B -1.331222117 -2.254453e-01    -1.32306097
## 157              B -0.152464329 -3.370464e-01    -0.23577258
## 158              M -0.901602644  4.790361e-01    -0.82592078
## 159              B -1.009433159 -2.254453e-01    -1.03498305
## 160              B -0.180840780  6.999132e-01    -0.20819940
## 161              B -0.243268973 -1.053153e+00    -0.29750356
## 162              B -0.813635645  1.558582e-01    -0.75102052
## 163              B -0.073010265 -7.160249e-01    -0.14194148
## 164              B -1.454943445 -1.136854e+00    -1.46545377
## 165              M  2.543298547  1.256329e-01     2.47462914
## 166              M  3.715245987  5.999372e-01     3.70924881
## 167              B  0.060359056 -1.353081e+00     0.02226293
## 168              M  0.897464370  6.603878e-01     0.92312375
## 169              B -0.277320715 -9.183017e-01    -0.27404579
## 170              B -0.109899652 -3.207712e-01    -0.15840308
## 171              M -0.271645425 -1.463946e-01    -0.24647261
## 172              M -0.041796169  7.680743e-02    -0.03494111
## 173              M -0.118412587  3.581350e-01    -0.07280278
```

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## 174              B -0.152464329  5.929622e-01    -0.19791091
## 175              M -0.197866651  7.913245e-02    -0.25223417
## 176              B -0.359612424 -2.998460e-01    -0.36129224
## 177              M  1.442292236 -1.673198e-01     1.37993303
## 178              B -0.870388548 -1.036878e+00    -0.89135562
## 179              M  1.283384108 -3.928469e-01     1.30585585
## 180              B -0.552572293  2.860593e-01    -0.60698156
## 181              B -0.538384067  6.285730e-02    -0.55265829
## 182              M  0.551271664  8.378249e-02     0.49923767
## 183              B -0.101386717 -1.399581e+00    -0.16087232
## 184              M  0.281695376 -6.067489e-01     0.28029845
## 185              B -0.824986226  1.326079e-01    -0.82427462
## 186              B -0.912953225 -1.613483e+00    -0.93950579
## 187              M  0.829360887 -4.874373e-02     0.88196977
## 188              M  1.226631206  6.092373e-01     1.16181689
## 189              M  1.711868523  8.610751e-02     1.61039537
## 190              B -1.244390176 -8.415760e-01    -1.25392227
## 191              M  0.562622244 -2.882209e-01     0.54039166
## 192              B -0.623513421 -1.948286e+00    -0.65142787
## 193              B  0.224942474 -1.013628e+00     0.18440965
## 194              M  0.117111959  1.918224e+00     0.19593277
## 195              M  0.446278794  2.372339e-01     0.37989110
## 196              M  1.411078139  1.627597e+00     1.52808739
## 197              M  0.270344796  1.499720e+00     0.24819833
## 198              B  0.139813120  1.099817e+00     0.10704015
## 199              B -0.189353716 -1.254694e-01    -0.18638779
## 200              B -0.544059357 -1.208929e+00    -0.54278134
## 201              M  0.244805990  1.374169e+00     0.14695952
## 202              B -0.944167321  6.255125e-01    -0.95390969
## 203              B  0.244805990  6.557377e-01     0.22885596
## 204              B -0.424878262  3.418599e-01    -0.40409239
## 205              B -0.685941614 -8.927265e-01    -0.69710880
## 206              M  0.378175311  1.083542e+00     0.48689147
## 207              B -0.717155711 -2.161453e-01    -0.74443588
## 208              M -0.671753388 -2.672957e-01    -0.69834341
## 209              B -0.178003135 -1.529782e+00    -0.25840727
## 210              M  1.975769521  1.692697e+00     2.08778165
## 211              B -0.351099488 -8.346009e-01    -0.32466519
## 212              M  0.165351926  5.348366e-01     0.14737106
## 213              M  0.871925564  1.216068e+00     0.91489296
## 214              B -0.240431328 -1.294955e+00    -0.25429187
## 215              B -0.921466160 -8.532011e-01    -0.88724022
## 216              B -1.122938965 -1.025253e+00    -1.12840260
## 217              B -0.390826520 -6.020988e-01    -0.38927696
## 218              B  0.020632024  2.883844e-01     0.01814753
## 219              M -0.475955874 -8.346009e-01    -0.38680772
## 220              M  2.594376160  6.394626e-01     2.47462914
## 221              B -0.399339456 -1.281005e+00    -0.41931937
## 222              B -0.405014746 -1.655333e+00    -0.45635796
## 223              M  1.533096880 -9.059411e-02     1.54454899
## 224              B -0.759720388  3.906853e-01    -0.74731666
## 225              B -0.983894353 -9.624771e-01    -1.00740987
## 226              B -1.569300544 -1.603448e-01    -1.55887333
## 227              B -1.263118634 -1.429806e+00    -1.14609882
## 228              M  1.717543814  5.820726e-02     1.72151114
## 229              M  0.968405498  7.056787e-03     0.95193155
## 230              B -0.816473290 -1.048503e+00    -0.84732086
## 231              B -0.708642775  2.325103e+00    -0.70369343
## 232              B -0.507169971 -1.008978e+00    -0.56294679
## 233              B  0.037657895  8.378249e-02     0.24120216
## 234              M  0.608024567  3.302348e-01     0.61446884
## 235              B -0.385151230  2.357653e+00    -0.43701558
## 236              B -0.694454549 -7.253249e-01    -0.67817796
## 237              M  0.207916603  9.114901e-01     0.34696791
## 238              B -1.576678421 -1.439106e+00    -1.54076557
## 239              B -0.986731998  1.378819e+00    -0.98600980
## 240              B -1.034971965  1.326079e-01    -1.03909844
## 241              M -0.047471459 -5.207231e-01    -0.02218337
## 242              B -1.532694922 -8.043757e-01    -1.48685385
## 243              B -1.342288933  5.557618e-01    -1.32594175
## 244              M  0.914490241  8.766148e-01     0.78320019
## 245              M  1.589849783  1.233079e-01     1.59393378
## 246              B -1.261132283  1.170683e-02    -1.27244156
```

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## 246                B -1.261152265  1.170683e-02    -1.27244156
## 247                B -1.162665996  4.627610e-01    -1.18437203
## 248                B  0.097248443  1.325344e+00     0.15807110
## 249                B -1.683090114 -5.695485e-01    -1.65681982
## 250                B -0.603649905  2.078651e+00    -0.62550085
## 251                B  0.258994215 -5.927987e-01     0.27824075
## 252                M  0.434928213  9.091651e-01     0.75027700
## 253                B -0.810798000 -8.811014e-01    -0.76501288
## 254                M  1.073398368  4.023104e-01     1.33466365
## 255                B -0.053146749 -1.422831e+00    -0.06827584
## 256                B -1.340018817  5.604119e-01    -1.33211485
## 257                B  0.114274313  1.170683e-02     0.09387087
## 258                B -0.785259194 -3.998219e-01    -0.80163993
## 259                B -0.382313585 -6.509243e-01    -0.43619250
## 260                B -0.166652555 -1.146154e+00    -0.18556471
## 261                B -0.575273454 -3.649466e-01    -0.57200067
## 262                B -1.088887223  1.934499e+00    -1.08231013
## 263                M  0.378175311  4.425713e-02     0.40046809
## 264                B -0.064497330 -1.154338e-02    -0.13329914
## 265                M  0.820847952  1.090517e+00     0.85727737
## 266                M -0.319885392  5.883121e-01    -0.18391855
## 267                B -1.114426029 -4.207471e-01    -1.10782561
## 268                B -1.486725071 -1.081053e+00    -1.36544958
## 269                B -0.532708777  7.324634e-01    -0.56747373
## 270                M  1.496207493  9.789157e-01     1.52808739
## 271                B -0.376638295 -4.253972e-01    -0.36705380
## 272                M  1.430941655  1.281168e+00     1.66389556
## 273                B -0.019095008 -4.904978e-01    -0.09132208
## 274                B -0.515682906 -6.439492e-01    -0.52590820
## 275                M  1.433779300  7.440886e-01     1.46224101
## 276                M  3.967796404 -1.905700e-01     3.97263434
## 277                B  0.210754248  2.139837e-01     0.17082883
## 278                M  0.701666856  2.043775e+00     0.67208442
## 279                B -0.927141450  5.092614e-01    -0.96543280
## 280                B -1.815608141  1.441595e+00    -1.81032420
## 281                M  1.113125400 -7.299750e-01     1.16181689
## 282                B -0.813635645  1.256329e-01    -0.85061317
## 283                B -0.586624034 -9.059411e-02    -0.63002779
## 284                B -0.138276103 -8.578512e-01    -0.18885703
## 285                M  0.869087919  6.464377e-01     0.80789259
## 286                B  0.145488410 -5.672235e-01     0.09222472
## 287                M  0.017794379  1.050991e+00     0.03707837
## 288                M  1.635252105  2.256088e-01     1.58570298
## 289                M  1.933204844  9.928658e-01     1.93139649
## 290                B -0.419202972 -2.603207e-01    -0.38186924
## 291                B -1.334911056  1.997275e+00    -1.34610720
## 292                B -0.124087878 -7.485752e-01    -0.16992620
## 293                M -0.101386717  6.975881e-01    -0.05510657
## 294                B -0.544059357 -2.951960e-01    -0.56212371
## 295                M  2.236832873  6.069123e-01     2.27297460
## 296                M  2.980295898  5.371617e-01     3.02609260
## 297                M  1.822536683  3.651101e-01     1.88612710
## 298                M  1.612550944  6.650378e-01     1.56512598
## 299                B -0.583786389 -1.360056e+00    -0.58187763
## 300                M  0.602349276  5.123219e-02     0.73381540
## 301                M  1.436616945 -7.788004e-01     1.41285622
## 302                B  0.037657895 -2.603207e-01    -0.03082571
## 303                B -0.915790870 -1.471657e+00    -0.95802509
## 304                M -0.206379587  2.860593e-01    -0.13700300
## 305                M  0.460467020  2.232838e-01     0.43750668
## 306                M  1.811186103  1.981000e+00     1.74620354
## 307                M  0.310071828  2.634331e+00     0.47042987
## 308                B -0.336911263 -7.253249e-01    -0.36170378
## 309                B  0.233455409 -1.208194e-01     0.24161370
## 310                B -0.160977264 -1.253105e+00    -0.13906070
## 311                M  1.799835522  3.209347e-01     1.75854973
## 312                M  0.900302015 -5.137480e-01     0.86550817
## 313                B -0.121250233 -3.835468e-01    -0.17321851
## 314                B -0.634864002 -4.486474e-01    -0.64895863
## 315                M -0.240431328  2.302588e-01    -0.19132627
## 316                B -0.189353716  2.074001e+00    -0.25017647
## 317                M  1.748757910 -1.150804e+00     1.77501133
## 318                M  2.577350289  1.785698e+00     2.53224473
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## 319              B -0.850525032  7.324634e-01    -0.84279392
## 320              B  0.179540151 -1.057803e+00     0.11938635
## 321              B -0.475955874 -6.695244e-01    -0.37528460
## 322              M  0.741393888  5.348366e-01     0.74616160
## 323              M  1.740244975  8.696397e-01     1.66389556
## 324              B -0.623513421  5.208865e-01    -0.63537781
## 325              B -0.484468810 -9.880524e-01    -0.54977751
## 326              M  1.229468851 -1.789449e-01     1.19885548
## 327              B -0.027607943  4.557859e-01    -0.08967592
## 328              M  0.468979955  8.417395e-01     0.56508405
## 329              B -0.319885392  3.465099e-01    -0.34812297
## 330              M  2.662479643  1.157942e+00     2.59809111
## 331              B -1.245525234 -1.701834e+00    -1.26462230
## 332              B -0.356774779  5.820726e-02    -0.38269232
## 333              B -0.944167321 -2.227289e+00    -0.95473277
## 334              B -0.552572293 -1.211254e+00    -0.60574694
## 335              M  0.233455409 -3.998219e-01     0.20087125
## 336              B  0.324260053 -1.483282e+00     0.25519451
## 337              B -0.450417068 -2.835709e-01    -0.51644278
## 338              B -1.446714274 -4.556225e-01    -1.36544958
## 339              M  1.317435850  4.976363e-01     1.27293266
## 340              B  0.454791729 -1.862260e+00     0.44573748
## 341              B  0.571135180 -1.029903e+00     0.50746846
## 342              M  1.388376978  1.232343e+00     1.23589407
## 343              M  0.605186921  6.022623e-01     0.63916123
## 344              B -0.802285065 -2.556706e-01    -0.74237818
## 345              M  0.576810470  5.232115e-01     0.58566104
## 346              B -1.234458418 -5.346732e-01    -1.21276828
## 347              B -1.489562716 -8.834264e-01    -1.44981526
## 348              B -0.765395678 -4.602725e-01    -0.75348976
## 349              M  0.261831860 -5.106875e-02     0.21774438
## 350              B -0.606487550  1.302094e+00    -0.59093150
## 351              B -0.030445588 -8.439010e-01    -0.09790671
## 352              M  0.976918434 -9.857273e-01     0.94781615
## 353              B -0.353937134  2.239077e+00    -0.38968850
## 354              B -0.790934484  4.581109e-01    -0.80205147
## 355              M  0.185215442  1.081217e+00     0.22350594
## 356              B -1.322992946  3.999854e-01    -1.31112631
## 357              B -1.206365731 -4.695726e-01    -1.19548360
## 358              B -0.649052227 -8.129402e-02    -0.67735488
## 359              M  1.169878303  1.605082e-01     1.13712450
## 360              B -1.360449862  6.162124e-01    -1.35639570
## 361              M  1.802673168  5.046114e-01     1.66801096
## 362              M  0.488843471  1.083542e+00     0.48277607
## 363              B -0.527033487  2.483205e+00    -0.59875076
## 364              B -1.097400158 -1.643708e+00    -1.07901781
## 365              B -0.552572293 -3.370464e-01    -0.58352379
## 366              B -0.734181581 -1.127554e+00    -0.71274731
## 367              M  1.008132530  3.372098e-01     1.04658572
## 368              B -1.240701238  2.071676e+00    -1.24651455
## 369              B -0.734181581 -1.992462e+00    -0.75060898
## 370              M  1.510395719  9.381808e-03     1.42108702
## 371              B -0.450417068 -6.904496e-01    -0.44113098
## 372              B -1.405852184 -1.262405e+00    -1.34857644
## 373              B -0.518520551 -6.269385e-02    -0.57981993
## 374              B -0.558247583 -2.928710e-01    -0.56294679
## 375              B -0.427715907 -4.974728e-01    -0.46705800
## 376              B -0.473118229 -1.501882e+00    -0.54072364
## 377              B  0.173864861  1.425320e+00     0.11239017
## 378              B -0.492981745 -4.207471e-01    -0.46623492
## 379              B -0.793772129 -1.192654e+00    -0.83044772
## 380              B -0.739856872 -1.013628e+00    -0.74484742
## 381              B -0.078685556  7.215739e-02    -0.13535684
## 382              B -1.026459030  8.835898e-01    -1.03374843
## 383              M  0.100086088  5.046114e-01     0.09387087
## 384              M  0.568297535 -3.277463e-01     0.61858424
## 385              B -0.790934484 -1.580197e-01    -0.79052835
## 386              B -1.097400158 -6.299991e-01    -1.07490241
## 387              M  2.163054099  3.953354e-01     2.27708999
## 388              B -1.032134320 -1.580197e-01    -1.03333689
## 389              M -0.146789039  1.323019e+00    -0.16128386
## 390              B  0.616537502 -8.346009e-01     0.52393006
## 391              M  1.027996046  2.032150e+00     1.04247032
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## 392              B -0.830661516  2.343703e+00    -0.87654019
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## 394              M  1.428104010  1.699672e+00     1.40874083
## 395              B -0.126925523 -6.881246e-01    -0.17321851
## 396              B -0.070172620 -7.276500e-01    -0.14811458
## 397              B -0.714318065 -7.602003e-01    -0.67941258
## 398              M  0.352636505  8.068641e-01     0.33873711
## 399              M  1.575661557  5.557618e-01     1.56101059
## 400              B -1.231620773  1.512081e-01    -1.22881833
## 401              B -1.214594902 -8.392510e-01    -1.19219128
## 402              B -0.214892522 -6.741745e-01    -0.24153414
## 403              M  1.459318106  1.669447e+00     1.47870261
## 404              M  1.848075490 -4.509724e-01     1.76266513
## 405              B -0.251781909  1.953835e-01    -0.20984556
## 406              M  1.791322587  5.790120e-01     1.72151114
## 407              B  0.579648115 -7.485752e-01     0.58977644
## 408              B -0.771070968 -1.969211e+00    -0.76665904
## 409              M  0.210754248 -6.090739e-01     0.27453689
## 410              B -1.294048966 -7.857755e-01    -1.30701091
## 411              B -0.351099488 -1.204279e+00    -0.28886122
## 412              B -0.796609774  1.811273e+00    -0.83168234
## 413              B -0.958355547 -1.004328e+00    -0.97572130
## 414              B -0.685941614 -6.090739e-01    -0.70986653
## 415              B -0.677428679 -1.225205e+00    -0.72962045
## 416              M  1.507558074 -1.091943e-01     1.48693340
## 417              B -0.765395678 -9.066766e-01    -0.77818215
## 418              B  0.083060217 -6.392991e-01     0.08975548
## 419              M  1.723219104  1.753148e+00     1.71739574
## 420              M -0.660402808 -6.299991e-01    -0.53413900
## 421              B -1.247511586 -9.183017e-01    -1.16009117
## 422              M  0.276020086  6.348126e-01     0.21774438
## 423              B -0.844849742 -1.443757e+00    -0.86830939
## 424              B -1.378894556 -1.492582e+00    -1.25433381
## 425              B -0.771070968 -1.015953e+00    -0.75883978
## 426              M -0.410690036  1.057966e+00    -0.38186924
## 427              B -0.617838131 -1.006653e+00    -0.60657002
## 428              B  0.207916603 -5.462983e-01     0.12020943
## 429              B -1.125776610  6.983236e-02    -1.12099488
## 430              M  0.338448279 -4.695726e-01     0.46219908
## 431              M -0.146789039  1.255593e+00    -0.17321851
## 432              M  1.186904174  3.000095e-01     1.18650928
## 433              B -0.603649905 -8.462260e-01    -0.61809314
## 434              M  1.237981786 -4.114471e-01     1.20708628
## 435              B -0.895927354 -4.858477e-01    -0.83291696
## 436              B -0.004906782 -1.490257e+00    -0.07979896
## 437              M  1.328786430  1.605082e-01     1.19062468
## 438              B -0.345424198 -6.881246e-01    -0.38845388
## 439              B -1.563341489 -1.743684e+00    -1.54858483
## 440              B -0.674591034  2.070086e-01    -0.65307403
## 441              B -0.325560682  1.403185e-02    -0.30655744
## 442              B -0.143951394  9.161401e-01    -0.19667629
## 443              M  0.264669505  1.256329e-01     0.34285251
## 444              B -0.186516071 -1.215904e+00    -0.19132627
## 445              M  0.945704337  4.647799e+00     0.88196977
## 446              B -1.311926130 -1.592558e+00    -1.30166089
## 447              B -0.107062007  1.041691e+00    -0.14111840
## 448              B -0.595136970 -3.161212e-01    -0.65348557
## 449              B -0.634864002 -2.184703e-01    -0.60286616
## 450              M  0.837873822  1.827549e+00     0.79143099
## 451              B -1.046322546 -8.904015e-01    -1.04321384
## 452              M -0.507169971  1.760123e+00    -0.44524638
## 453              M  1.538772170  9.114901e-01     1.51985660
## 454              B -0.640539292  5.232115e-01    -0.62303161
## 455              B -0.634864002  4.371857e-01    -0.64113937
## 456              B  0.088735507 -9.555021e-01     0.08234776
## 457              B -0.169490200 -1.941311e+00    -0.16704542
## 458              M  1.873614296  2.750582e+00     1.79970372
## 459              B -1.548301970 -1.125229e+00    -1.54529251
## 460              B -0.317047747  6.813130e-01    -0.40985395
## 461              M  3.771998890  1.622947e+00     3.90678796
## 462              M  1.331624075  6.231874e-01     1.30585585
## 463              B -0.876063838 -1.013628e+00    -0.87654019
## 464              B -0.098549072 -8.136758e-01    -0.14811458
```

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## 464                B -0.098549072 -8.156758e-01    -0.14811458
## 465                M  0.854899693 -6.718494e-01     0.98897014
## 466                B -0.490144100 -3.742467e-01    -0.43207711
## 467                B -0.263132489 -8.067007e-01    -0.32507673
## 468                M  1.107450110 -5.672235e-01     1.05070112
## 469                B -1.100237803 -7.229999e-01    -1.04732924
## 470                B -0.024770298 -7.695003e-01    -0.09008746
## 471                B -0.385151230  4.929862e-01    -0.40944241
## 472                B  0.239130699  1.093577e-01     0.14531336
## 473                B -0.311372457 -2.021951e-01    -0.38516156
## 474                M  1.533096880  3.064460e+00     1.48281801
## 475                B -0.592299325  2.057726e+00    -0.62220853
## 476                M  1.161365367 -9.756917e-02     1.10008591
## 477                B -0.589461680  7.975640e-01    -0.54401596
## 478                M  1.978607166  2.860593e-01     1.89847330
## 479                B  0.236293054 -4.409368e-02     0.20827896
## 480                M -0.087198491  1.209093e+00     0.01485522
## 481                B  0.105761378 -1.952936e+00     0.09510549
## 482                M  0.083060217  1.116827e-01     0.10333629
## 483                M  1.277708818  1.353244e+00     1.35112524
## 484                B -1.198420325 -2.858959e-01    -1.12634490
## 485                B -0.700129840 -5.160730e-01    -0.75184360
## 486                M  0.460467020 -1.619343e-02     0.62269963
## 487                B -1.265672515 -1.859200e-01    -1.25433381
## 488                M  2.310611646  8.843253e-02     2.50343693
## 489                B -0.274483070  2.907094e-01    -0.32548827
## 490                M -0.864713257 -1.068693e-01    -0.76830520
## 491                M  1.101774820  2.953594e-01     1.08773971
## 492                M  1.836724909  2.334403e+00     1.98078127
## 493                M  0.378175311 -1.720434e+00     0.43339128
## 494                B -0.898764999 -3.881968e-01    -0.87160171
## 495                B -1.569016779  3.930103e-01    -1.53541555
## 496                B -0.353937134 -2.486956e-01    -0.30943822
## 497                B -1.206365731  2.565696e-02    -1.15309499
## 498                M -0.271645425  5.859871e-01    -0.26951885
## 499                M  1.538772170  2.204202e+00     1.71328034
## 500                M  0.398038827  3.317887e+00     0.48277607
## 501                M  0.727205662  2.116587e-01     0.62269963
## 502                M  0.537083438  9.184652e-01     0.44162208
## 503                M  0.568297535  3.232597e-01     0.66385362
## 504                B -1.009433159  2.163087e-01    -0.89794026
## 505                B -0.711480420 -2.579956e-01    -0.64155091
## 506                B -0.824986226  3.376013e+00    -0.87160171
## 507                B  0.046170830 -5.741986e-01    -0.06868738
## 508                B  0.193728377 -1.067103e+00     0.11074401
## 509                M  1.927529553  1.348594e+00     2.10012784
## 510                M  0.389525891  4.162605e-01     0.44985288
## 511                B -0.297184231 -8.322759e-01    -0.26087651
## 512                M  1.079073659  1.206768e+00     0.95604695
## 513                M -0.649052227 -1.370945e-01    -0.57776223
## 514                B -0.135438458 -1.425156e+00    -0.16828004
## 515                M  0.630725728  9.300903e-01     0.70089221
## 516                M -0.368125359  7.068882e-01    -0.27610349
## 517                M  1.828211974 -3.533215e-01     1.68447255
## 518                M  1.578499202  4.557859e-01     1.56512598
## 519                M  1.161365367 -1.370945e-01     1.16593229
## 520                B -0.288671295  7.557137e-01    -0.20367247
## 521                B -1.034971965 -1.002002e+00    -1.00740987
## 522                B -0.470280584 -1.603448e-01    -0.44771562
## 523                M  0.284533021  2.446004e+00     0.19510969
## 524                B -1.806811442  1.220718e+00    -1.81279344
## 525                B -2.027863997 -1.362381e+00    -1.98275941
## 526                B -0.356774779 -7.160249e-01    -0.39462698
## 527                B -0.427715907  1.088192e+00    -0.43701558
## 528                M  1.084748949  1.674833e-01     0.91489296
## 529                B -0.782421549 -9.291913e-02    -0.81480920
## 530                B -1.265388750 -2.765958e-01    -1.27203002
## 531                B -0.620675776  3.418599e-01    -0.58023147
## 532                B -1.826391193  1.429970e+00    -1.79550876
## 533                B -0.399339456 -3.765717e-01    -0.45224256
## 534                M  0.661939824  1.907335e-01     0.71323841
## 535                M  1.606875653  1.355569e+00     1.58158758
## 536                B -0.368125359 -8.276259e-01    -0.37363844
```

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## 537               B -0.739856872 -1.254694e-01    -0.76665904
## 538               B -0.688779259 -4.176866e-02    -0.72591659
## 539               B -0.073010265  3.279097e-01    -0.09049900
## 540               B -0.717155711 -1.499557e+00    -0.72550505
## 541               M  0.818010306  2.256088e-01     0.72970001
## 542               B -1.371232914 -1.253105e+00    -1.31729941
## 543               B -0.439066487 -2.068452e-01    -0.49956965
## 544               M  1.762946136  5.162365e-01     1.80793452
## 545               M  1.717543814  1.088192e+00     2.12893563
## 546               B -0.334073618 -7.602003e-01    -0.36334994
## 547               B -1.469131671 -8.206508e-01    -1.36750728
## 548               B -0.387988875 -1.045442e-01    -0.41561551
## 549               B -0.021932653  1.827549e+00    -0.02424107
## 550               B -0.589461680 -1.083378e+00    -0.57323529
## 551               B -0.362450069  4.836862e-01    -0.38433848
## 552               B -0.847687387 -1.213579e+00    -0.85308241
## 553               M -0.473118229  1.104467e+00    -0.32919213
## 554               B -0.674591034 -4.021470e-01    -0.66171636
## 555               B -0.260294844  1.385794e+00    -0.32384211
## 556               M  2.123327068  6.952631e-01     2.15774343
## 557               B -0.745532162 -1.952201e-01    -0.76912828
## 558               B  0.159676636 -1.234505e+00     0.25725221
## 559               B -0.864713257 -1.064778e+00    -0.89547102
## 560               B  0.190890732 -3.788968e-01     0.16095188
## 561               M  0.034820250  5.650619e-01     0.06835540
## 562               B -0.546897003 -9.485270e-01    -0.57446991
## 563               B  0.077384927  1.790348e+00     0.01156290
## 564               B -0.359612424 -1.387956e+00    -0.37651922
## 565               B -0.271645425 -2.486956e-01    -0.31643440
## 566               B -1.097400158 -1.064778e+00    -1.06049852
## 567               M  0.327097698  7.254884e-01     0.28606000
## 568               B  0.114274313 -1.234505e+00     0.07782082
## 569               M  2.055223584 -9.741022e-01     2.03016606
##        area_mean smoothness_mean compactness_mean concavity_mean
## 1   -0.542146756     0.457882546     -0.653837927   -0.613766097
## 2   -0.876603348     0.036953503      0.196146087   -0.312711686
## 3   -0.800448406     0.806286653     -0.498004369   -0.731804513
## 4   -0.767485819     1.424881700      0.175317786   -0.532481406
## 5    0.161718134    -1.189571158     -0.662737292   -0.688277063
## 6   -0.696729922    -0.775041374     -0.513530920   -0.425857969
## 7   -0.714347856    -0.266655790     -0.042432629    0.280992699
## 8   -0.162224529     2.555417474      1.371998332    0.840452144
## 9   -0.905871851     0.250973169     -0.351448872   -0.738201920
## 10  -0.798459284     0.493433986     -0.253177162   -0.436896631
## 11   1.889980655     0.863168956      1.137206580    1.630719971
## 12  -0.552944845    -0.698250265     -0.711021080   -0.626560909
## 13  -0.335278109    -0.683318660      0.086324138    0.247124077
## 14  -0.362841651    -1.120601365     -1.258237342   -1.105212334
## 15   1.523413958     0.486323698     -0.106621665    0.962128302
## 16   0.006282488    -0.826946476      0.542653271    0.176878048
## 17   0.303514089    -0.123739003     -0.184065074   -0.218883062
## 18  -0.468833417     0.457882546     -0.524513115   -0.713364931
## 19   1.682543687     0.827617517      1.504542064    1.749887342
## 20  -0.565732056     0.728073486     -0.175165709   -0.755763427
## 21  -0.666608937     0.098101979     -0.812890405   -0.636094299
## 22  -0.706107209     1.936822428      0.963006247   -0.547534126
## 23  -0.809541533     0.287235637     -0.563140145   -0.493720651
## 24   0.055726368     1.325337669      1.445844126    0.313606926
## 25  -0.911270896     1.126249608      0.491529260   -0.301547585
## 26  -0.201154480     0.308566501      0.447979177   -0.136845735
## 27  -0.283560947     0.415220819     -0.429649673   -0.615396808
## 28   0.220255141     0.841838093      1.237561119    0.997251316
## 29  -1.063864939    -0.821258245     -0.228372550   -0.057442634
## 30  -0.291233273    -1.208057907     -0.897150348   -0.840309540
## 31  -0.353180203    -0.912980959     -1.268462144   -1.056704942
## 32  -0.422231139    -0.413127720     -0.884842716   -0.522948016
## 33   0.925256673    -0.246746984      1.818860055    1.565491516
## 34  -0.536463552    -0.676208372     -0.739991353   -0.711107023
## 35   0.011113212     0.139341649     -0.287070488   -0.082530502
## 36  -0.211100088    -0.972707377     -0.546477505   -0.580900990
## 37   1.350076217    -0.445835045     -0.027284774    0.240852111
## 38  -0.631088909     1.339558245      0.478274887   -0.648512793
## 39   0.657577736    -0.548223190     -0.237082566   -0.057442634
```

```
## 40   0.426839629    0.728073486     1.436376716   1.329665561
## 41   1.799049381    0.258794485     0.084430656   0.791530803
## 42   1.588770811    1.112029032     1.178863181   2.032125852
## 43  -0.763791736    3.280666839     3.399917422   1.914212875
## 44  -0.399498321   -0.123739003    -0.088822935  -0.645000492
## 45  -0.157677965   -1.996588834    -0.968534615  -0.834915649
## 46   1.048866373   -1.610500201    -0.339330588   0.269703158
## 47  -0.777999748   -1.055897746    -1.249716674  -0.942166283
## 48   3.850686244    1.318227381     2.498620049   3.110904155
## 49  -0.275036140    0.678301471     0.196146087  -0.037623219
## 50  -0.521687220   -0.842589109    -0.055687002  -0.257142060
## 51  -0.215930812    0.443661971     0.896734381   0.128082146
## 52   0.084142391   -0.899471412     0.099578511  -0.297909845
## 53  -0.633646351   -0.390374799    -0.795659720  -0.756014306
## 54  -0.088058708   -1.004703673    -0.008349956   0.269703158
## 55   2.927165495    1.261345078     1.970338605   3.305335129
## 56  -0.383301188    0.813396941     0.930817055   0.352493121
## 57  -0.650411804   -1.092871243    -0.146384784  -0.270187751
## 58  -0.958725654   -0.262389617    -1.086687884  -1.093860074
## 59   3.143127271    3.437093173     3.452934915   4.239858194
## 60   1.392700252    0.521875137     0.754723241   0.925750894
## 61   1.276194557   -0.394640972     2.171047684   1.529114108
## 62   0.936907242    0.607198592     1.059573823   1.594342564
## 63   0.832904598    0.301456213     0.194252605   0.995996923
## 64  -0.261112289   -1.048076429    -0.833718706  -0.723776396
## 65   0.140690277    0.777845502     2.066906181   1.491482307
## 66  -0.541010116    0.344117940    -0.053793521  -0.440283493
## 67  -0.308282887   -0.846855282    -1.030072776  -0.668081330
## 68   0.028446986   -1.434876090    -1.310118746  -0.932382014
## 69  -0.191777192   -0.085343448    -0.519968759  -0.552049943
## 70  -0.678259507    0.372559092    -0.185769207  -0.587047518
## 71  -0.271910377    0.372559092     0.400642130   0.219527423
## 72  -0.977764390    0.308566501    -0.588512803  -0.798914559
## 73  -1.166162622    0.236041564     1.758268635   1.363534182
## 74   0.958219260   -1.278449757    -0.798499943  -0.556314880
## 75   0.640243962   -1.557884071    -0.608015666  -0.467880147
## 76  -0.536463552   -0.614348868    -0.187283993  -0.359375120
## 77   1.097173612   -0.745178165    -0.372277172  -0.089178787
## 78  -0.741058918   -1.064430091    -1.085551795  -0.648638233
## 79  -0.428482664   -0.598706234    -0.470738230  -0.605612540
## 80   0.957082619    0.514764850     0.493422742   0.392633709
## 81   0.088120634    0.155695311    -0.482667166  -0.787499579
## 82  -0.543283397   -1.106380790    -0.602335220  -0.631703922
## 83  -0.309135368   -0.749444338    -0.768961625  -0.694423591
## 84  -0.008493844    1.197352487     0.559694607   0.136235703
## 85  -0.763223416    1.943932716     0.127980740  -0.122921969
## 86  -0.394951757   -1.906288177    -1.269598234  -0.830399833
## 87  -0.529643706   -0.450101217    -0.781458606  -0.742843175
## 88  -0.277593582   -0.278032250    -0.569577984  -0.760279243
## 89   2.128675248   -0.147913982    -0.040539147   0.262176798
## 90  -0.238379470    0.199068067     0.050347983  -0.438401903
## 91  -0.415127134   -0.637812818    -1.261077565  -0.998576353
## 92  -0.496681120   -0.503428376    -0.530950954  -0.661182166
## 93   0.294705122   -1.277027699    -0.912298203  -0.585918564
## 94  -0.382732867   -0.900893470    -1.015114269  -0.962612895
## 95  -0.127841141    0.792066077     2.593294143   1.371060543
## 96   0.393024562   -0.103119168     0.620286027   0.396396889
## 97  -0.368524856   -1.624720777    -0.480016291  -0.604985343
## 98  -0.631373069   -0.898760383    -0.907375151  -0.776711796
## 99  -0.971228704    0.692522047    -0.365839334  -0.892115987
## 100  3.475594740    0.706742623     3.070451576   3.074526748
## 101 -0.880865751    0.841838093     0.465020514  -0.054181212
## 102 -1.042268762   -1.909843321    -1.531845474  -1.113892736
## 103 -0.758392692    0.140763706    -0.535116614  -0.704333298
## 104  0.084142391    0.164227657    -0.612370674  -0.186268834
## 105 -0.321922578   -1.721420692    -1.119066424  -0.569987768
## 106 -0.710369613    0.585867728    -0.417720737  -0.448060732
## 107 -0.480483986   -0.622881213    -0.010243437   0.178132442
## 108 -0.573404382    0.941382123     0.205613496  -0.088426151
## 109 -0.833410993   -1.026745565    -0.725600890  -0.919712641
## 110 -0.780273029    0.386779668    -0.843754160  -1.001561809
## 111 -0.688773435    1.268455366    -0.050006557  -0.227036619
## 112 -1.281531676   -0.164267644     0.495316224   0.543160914
```

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## 112 -1.281551676 -0.164267644  0.495516224  0.345160914
## 113  1.199471295  0.642750032  0.107152439  0.713758413
## 114 -0.217635773  1.190242199  2.366076318  1.555456369
## 115 -0.645012760 -0.710337754 -1.035374525 -0.906039753
## 116  0.778345834 -0.927912564  0.124193776  0.396396889
## 117 -0.034636585  0.167782800  0.307861518  0.366291448
## 118  0.255206850  1.396440548  0.981941066  1.258165139
## 119  1.634236448 -0.179910277  0.497209705  0.481695639
## 120 -0.406034006  0.841838093  0.493422742  0.090701223
## 121 -0.188083109 -0.605105493 -0.813837146 -0.935768876
## 122  1.804732586 -0.388241713  0.576735944  0.943312401
## 123 -0.675417904 -1.537264236 -0.898665134 -0.866275483
## 124  2.532182775 -0.179199249 -0.354478443  0.351238728
## 125 -0.716621138 -0.398196116 -0.861174193 -0.789381169
## 126 -0.715484497 -0.556755536 -0.518832670 -0.694423591
## 127 -0.354316844  3.088689066  1.366317887  1.483955946
## 128  0.027878666 -0.678341459 -0.719163052 -0.061456693
## 129  1.372809036 -1.008969846 -0.455590375  0.049055363
## 130 -0.071293255  0.528985425  0.209400460  0.721284774
## 131  0.085563192  0.221109960  2.237319550  2.314364362
## 132 -0.226160580 -0.411705663  0.196146087  0.097474948
## 133 -0.331015705 -0.686162775 -0.673530139 -0.739205434
## 134  2.341795421  1.040926154  0.218867870  1.945572709
## 135 -0.819487141  1.638190336  0.052241464 -0.604232707
## 136  0.709579058  1.119139320  0.783125469  0.799057163
## 137 -1.195146966  0.536095713 -0.569199287 -1.113892736
## 138 -0.586191592 -0.231104350 -0.983303774 -0.866526362
## 139  0.749361490  1.104918745  0.023839236  0.777732476
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## 387  2.375894649    -0.167111759     1.737440335    1.639500725
## 388 -0.910986735     0.742294062    -0.711210428   -0.825758577
## 389 -0.205132723    -0.105252255    -0.364135200   -0.031978449
## 390  0.468611183    -0.148625011    -0.704772590   -0.420714956
## 391  0.928382435     0.256661399     0.512357560    1.016067217
## 392 -0.764075896    -1.555039956    -1.301976774   -1.113892736
## 393 -0.236106188    -1.387237161    -0.828416956   -0.880951886
## 394  1.372809036     0.401000243     0.775551541    1.295796940
## 395 -0.225592260    -0.255279329    -0.601956524   -0.894123016
## 396 -0.165634451    -1.855805133    -1.060936531   -0.857369290
## 397 -0.700992325     0.884499820     0.235909207   -0.223649757
## 398  0.208320412    -0.310028546    -0.014030401    0.293536632
## 399  1.531938765     0.114455641     0.559694607    1.223042124
## 400 -1.024082507     0.429441395    -0.971942883   -1.028230212
## 401 -1.027776590    -0.102408139    -0.381555233   -0.821619079
## 402 -0.288107511    -1.792523571    -0.588702151   -0.098837616
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## 403  1.441007491    -0.167111759      1.279217721    0.964637089
## 404  1.932604689    -0.135115464      0.061708874    0.801565950
## 405 -0.318228495    -0.961330917      0.340050710    0.153044574
## 406  1.813257393    -0.345579985      0.165850377    0.115287334
## 407  0.379669031     0.173471031      0.747149313   -0.279595701
## 408 -0.714916176    -0.187020565     -0.709884991   -0.673349782
## 409  0.078459187     1.410661124      1.146673989    1.006032070
## 410 -1.066422381    -0.833345735     -1.201811582   -0.906666950
## 411 -0.405465686    -0.622881213      0.572948981    0.609643763
## 412 -0.736512354    -1.957482250     -1.253692986   -0.909050297
## 413 -0.851313087    -1.310446052     -1.002617289   -0.831528787
## 414 -0.657231650     0.621419168     -0.821600422   -0.663314635
## 415 -0.646717721    -1.296225476     -1.153906491   -0.832281423
## 416  1.455215502     0.891610108      0.766084132    1.716018721
## 417 -0.724861785     0.002113093     -0.671257961   -0.674478736
## 418 -0.038898989     0.081748317      0.180998232   -0.109499959
## 419  1.645602857     0.191246750      1.184543627    0.944566795
## 420 -0.633362190     0.905830684      1.243241565    0.967145875
## 421 -1.007885374     0.770735214      1.051999895    4.039155254
## 422  0.164559736    -0.412416691     -0.634903109   -0.454959895
## 423 -0.775726466     0.083881403     -1.007540342   -0.865271969
## 424 -1.154227893     4.766717009      2.263828296    0.106632019
## 425 -0.718610259    -0.410283605     -0.431543155   -0.338552190
## 426 -0.442974836     1.126249608      0.413896503    0.301062993
## 427 -0.648422683     1.382219972      0.307861518   -0.967003271
## 428  0.053453086    -0.506272492     -0.636228546   -0.694172712
## 429 -0.975206947     0.280125349     -0.554808825   -1.050859469
## 430  0.165980537     2.640740929      2.349034981    1.956862249
## 431 -0.233832907    -0.268788876     -0.487022174   -0.450945836
## 432  1.128431238     0.742294062      0.387387757    0.854250472
## 433 -0.601252084     0.061839511     -0.618997861   -0.593194045
## 434  1.173896874     0.344117940      0.518038006    0.756407788
## 435 -0.805279130    -0.512671751      0.131767703    0.072387080
## 436 -0.109086565    -0.232526408     -0.970996142   -0.892492305
## 437  1.270511353    -0.506983520     -0.861552889   -0.107869248
## 438 -0.393530956    -1.205213791     -0.959635250   -0.628066181
## 439 -1.222994668     0.082459346     -0.977433980   -0.855362261
## 440 -0.668029738     0.891610108      0.184785196   -0.255511348
## 441 -0.400350802    -0.040548635      0.154489486   -0.222395363
## 442 -0.232127945    -0.277321222     -0.698145403   -0.740836146
## 443  0.144100200     0.536095713      0.964899729    1.018576004
## 444 -0.308567047     0.763624926      0.211293942   -0.388100728
## 445  0.755044695     0.125121073      0.482061850    0.663582678
## 446 -1.082619515     0.429441395     -0.746429191   -0.743094054
## 447 -0.184389026    -1.132688855     -0.686784512   -0.524704167
## 448 -0.593579758    -1.388659219     -1.238734479   -1.094499814
## 449 -0.632793870    -0.194130853      0.209400460   -0.281477291
## 450  0.784313199     0.186269549      0.126087258    0.149281394
## 451 -0.924342266     0.635639744     -0.513530920   -1.030563384
## 452 -0.504353446     0.500544274      0.586203354    0.247124077
## 453  1.475106719     0.329897364      0.519931488    1.214261371
## 454 -0.633362190    -2.149460023      0.038987091   -0.012911669
## 455 -0.628247306     0.097390950     -0.438170342   -0.793395228
## 456 -0.042024751     0.237463622     -0.042432629   -0.049289077
## 457 -0.271910377     2.327888262      0.006797899   -0.251246411
## 458  2.171299283    -0.118761802      0.188572160    0.600863010
## 459 -1.215322342    -0.354112331     -1.166024775   -1.113892736
## 460 -0.365114933    -2.406852445     -1.608720838   -1.093885161
## 461  5.245912975     0.856058668      1.788564345    3.445827187
## 462  1.293244171     0.386779668      0.654368701    0.885610306
## 463 -0.801869207    -1.172506467     -0.635281805   -0.669084845
## 464 -0.196039596    -0.582352572     -0.703636501   -0.981554235
## 465  0.732596037     1.581308033      2.333887126    1.682150100
## 466 -0.531632828     0.642750032      0.516144524   -0.142866823
## 467 -0.334141468    -0.799927382     -0.981410292   -1.095566049
## 468  0.952251895    -0.489918829      0.357092047    0.253396044
## 469 -0.939686919     0.692522047      0.127980740   -0.270187751
## 470 -0.124147058    -0.837611907     -0.859470059   -0.670590117
## 471 -0.419105377    -0.630702530     -0.725790239   -0.723525517
## 472  0.100339524    -0.863919973     -0.962286125   -0.869662345
## 473 -0.372503099    -0.464321793     -1.262592351   -0.792517153
## 474  1.614345231    -0.864631001      0.163956895    0.322387680
## 475 -0.582497509    -0.628569443     -0.839588499   -0.816977824
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## 476  1.057391180     0.078193173      0.139341631    0.303571779
## 477 -0.588464874    -1.920508753      0.056028428   -0.117528077
## 478  2.071843202     0.034109388      0.249163580    0.858013652
## 479  0.092098878    -0.457922534     -0.115710378   -0.368783070
## 480 -0.167623573     1.410661124      1.207265409    0.588319076
## 481 -0.040319790     0.976933562      0.105258957   -0.004758112
## 482 -0.035204906     0.082459346      0.184785196    0.063731766
## 483  1.230728920     0.713852911      1.597322676    1.795045504
## 484 -1.001633849     0.044774820      0.474487923    0.525599407
## 485 -0.664619816    -1.475404731     -1.288343704   -1.009702822
## 486  0.294705122     1.986594443      2.500513531    2.541409563
## 487 -1.039427160    -0.490629858     -0.790736667   -0.744097568
## 488  2.427043490     2.576748338      3.265480209    4.234840621
## 489 -0.330163225    -1.636097238     -0.976865935   -0.888101928
## 490 -0.833410993     1.794616670      2.102882337    1.004777677
## 491  1.000559134     0.265904773      0.465020514    0.353747514
## 492  1.733692528     1.524425730      3.269267173    3.294045588
## 493  0.233042352     2.086138474      0.968686693    1.435034605
## 494 -0.822044583     0.036242474     -0.129154099   -0.453705502
## 495 -1.230666995     1.986594443     -0.278549819   -0.737574723
## 496 -0.459740290     1.808837246      1.169395772   -0.508647932
## 497 -1.013284418     0.294345925     -0.139568250   -0.341939052
## 498 -0.350622761     0.055440252      0.006797899   -0.077889246
## 499  1.568879595    -0.267366818      1.930575486    1.123945047
## 500  0.255775170     0.706742623      1.127739170    1.082550066
## 501  0.576023750    -1.520910574     -0.629033315   -0.656164593
## 502  0.406095932    -1.016791162     -0.712914562   -0.700068361
## 503  0.408937534     1.467543427      1.852942729    1.046172658
## 504 -0.899620326    -0.400329202      1.167502290    1.746124162
## 505 -0.699287364     1.503094866      0.832355998    0.165588508
## 506 -0.761802615    -1.319689426     -1.298947203   -1.051587017
## 507 -0.063336768    -2.280289321     -1.469171223   -1.022949216
## 508  0.073344302    -0.827657504     -1.025907116   -0.685391958
## 509  1.966703917     0.962712987      2.258147851    2.867551840
## 510  0.421156424     1.112029032      0.998982403    0.795293983
## 511 -0.383301188     0.792066077      0.429044358   -0.540885842
## 512  0.977542155    -0.555333478     -0.645127911   -0.399013951
## 513 -0.608924411     1.033815866      0.894840900    0.413958397
## 514 -0.244346835     0.007090294     -0.326265563   -0.626184591
## 515  0.527148190     0.075349058      0.858864744    1.157813669
## 516 -0.431040106     0.884499820      1.430696271    1.012304037
## 517  1.907030269    -0.826235447     -0.486643478   -0.023824892
## 518  1.557513185     0.941382123      1.051999895    1.362279789
## 519  1.074440794     1.311117093      0.836142961    1.108892327
## 520 -0.356590126     0.273015061      0.832355998   -0.021943302
## 521 -0.912975857     0.127965188     -0.057580484   -0.319234532
## 522 -0.491566235     0.233908478      0.027626200   -0.109750838
## 523  0.183598472    -0.935733880     -1.103729221   -0.526084000
## 524 -1.346604368    -3.109348889     -1.149740831   -1.113892736
## 525 -1.453164455     1.467543427     -0.542690541   -1.113892736
## 526 -0.405465686    -0.150047068     -0.798121246   -0.624679319
## 527 -0.450363002    -1.232232885     -0.550075120   -0.431753618
## 528  0.929519076    -0.877429520     -0.702879108   -0.199063646
## 529 -0.735659873    -0.656299566     -1.027421902   -0.812963765
## 530 -1.047383646    -0.942133139     -0.947895663   -0.928367955
## 531 -0.607787770    -0.733090675     -0.061367448   -0.289254530
## 532 -1.376725353    -0.688295862      0.294607145    0.046672016
## 533 -0.436439151    -1.237210087     -1.119445121   -0.938026784
## 534  0.505836173     0.138630620      0.970580175    1.135234588
## 535  1.526255560     0.365448804      1.033065077    2.078538407
## 536 -0.420526178    -0.423793152     -0.409957462   -0.381954201
## 537 -0.698719043    -0.079655218     -0.939374994   -0.733058907
## 538 -0.671155501    -0.584485658     -0.981031596   -0.915322264
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## 541  0.708726577    -0.614348868     -0.592678463   -0.242089339
## 542 -1.128369312     2.896711293      0.343837673   -0.695928863
## 543 -0.471390859    -0.883828779     -1.177385666   -1.090561019
## 544  1.730850926     1.467543427      1.574600893    2.103626274
## 545  1.676860482     2.292336822      4.564408776    3.595099999
## 546 -0.401203282     0.294345925     -0.471684971   -0.341813613
## 547 -1.164173501    -0.123739003      0.377920347    0.048051849
## 548 -0.449794682     0.028421158     -0.469980837   -0.776711796
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## 548 -0.449794682     0.028421156     -0.469980857   -0.776711796
## 549 -0.154836363     0.208311441      0.156382968   -0.554182411
## 550 -0.584202471     0.479213410     -0.254123903   -0.286996622
## 551 -0.398930000    -1.482515019     -0.401058097   -0.345451353
## 552 -0.768054140    -1.679469994     -0.827470215   -0.548788520
## 553 -0.508615849     1.581308033      2.561104951    1.737343408
## 554 -0.659220771     0.777845502     -0.136538679   -0.451322154
## 555 -0.332436506    -0.600839321     -0.990120309   -0.766174892
## 556  2.137200055     1.446212563      1.976019051    2.410952652
## 557 -0.703265607    -0.206929371     -0.841292633   -0.782983763
## 558  0.003440886     0.479213410      1.500755100    0.704977660
## 559 -0.801869207     0.301456213     -0.888250984   -0.817479581
## 560  0.056578849    -0.324960150     -0.292372237   -0.603480071
## 561 -0.062200127     0.132942390      0.103365475    0.540652128
## 562 -0.559764691    -0.684740718     -0.736393737   -0.863766697
## 563 -0.024975137    -1.877847026     -0.986712041   -0.677865598
## 564 -0.426493543     1.211573063     -0.302975736   -0.637223253
## 565 -0.334141468    -1.542952466     -0.840724589   -0.504382994
## 566 -0.947075085     0.174893088     -0.241437575   -0.664694468
## 567  0.158308211    -0.411705663      0.016265309   -0.439656296
## 568 -0.030374182     0.962712987     -0.225721675   -0.248988503
## 569  2.077526407     0.265904773      0.892947418    1.309595267
##      points_mean
## 1   -0.307171959
## 2   -0.579832380
## 3   -0.621581896
## 4   -0.024718442
## 5   -0.575966684
## 6   -0.892696038
## 7   -0.202798168
## 8    1.104064774
## 9   -0.951196903
## 10  -0.399690949
## 11   1.628253144
## 12  -0.659981142
## 13  -0.356137441
## 14  -1.153321259
## 15   1.074943198
## 16  -0.297894289
## 17   0.268301311
## 18  -0.717708868
## 19   2.038016914
## 20  -0.517981244
## 21  -0.425977681
## 22  -0.093012404
## 23  -0.505095591
## 24   0.938612987
## 25  -0.470046615
## 26   0.045637224
## 27  -0.544267977
## 28   0.994536722
## 29  -0.670031952
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## 31  -1.033175429
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## 34  -0.576997536
## 35  -0.139916181
## 36  -0.623901313
## 37   0.788366272
## 38  -0.486797964
## 39   0.434010810
## 40   1.072108354
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## 42   2.053479698
## 43   1.450431130
## 44  -0.720028286
## 45  -0.915632501
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## 50  -0.462057510
```

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## 51   0.182998287
## 52  -0.286554914
## 53  -0.838576295
## 54  -0.124711110
## 55   2.914241328
## 56   0.539930879
## 57  -0.580605519
## 58  -1.198756072
## 59   3.924476535
## 60   1.178286136
## 61   1.306369528
## 62   1.427236955
## 63   0.439422784
## 64  -0.737295061
## 65   1.253538350
## 66  -0.533444028
## 67  -0.627767009
## 68  -0.776982873
## 69  -0.304337115
## 70  -0.704823215
## 71   0.140991057
## 72  -0.803269605
## 73   0.004145421
## 74  -0.183985115
## 75  -0.546587394
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## 77   0.237633456
## 78  -0.686010162
## 79  -0.604057408
## 80   1.013349776
## 81  -0.286297201
## 82  -0.834452886
## 83  -0.636013827
## 84   0.559774785
## 85   0.169597207
## 86  -0.958928295
## 87  -0.578543814
## 88  -0.419534854
## 89   0.963868867
## 90  -0.285781775
## 91  -0.917951918
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## 94  -0.806619875
## 95   0.444834759
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## 99  -0.767189776
## 100  3.494095720
## 101 -0.521846940
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## 123 -0.922333040
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## 124  0.920830786
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## 127  1.213592825
## 128  0.097695263
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## 132 -0.020595033
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## 177  1.057160996
## 178 -1.073971407
## 179  1.339614513
## 180 -0.804558170
## 181 -0.202282742
## 182  0.449989020
## 183 -0.766674350
## 184 -0.209498708
## 185 -1.065286476
## 186 -0.907901109
## 187  1.548362094
## 188  0.503851050
## 189  0.730380832
## 190 -0.898108012
## 191  0.270878441
## 192 -0.797857631
## 193 -0.430616516
## 194  0.637088704
## 195  0.076562792
## 196  2.525094603
```

```
## 196  2.525094603
## 197  0.428083410
## 198 -0.498652765
## 199 -0.448398717
## 200 -0.607665390
## 201 -0.513600122
## 202 -0.898881152
## 203 -0.261814460
## 204  0.290980060
## 205 -0.423142837
## 206  0.935005004
## 207 -0.802754179
## 208 -0.354848876
## 209 -1.146826889
## 210  2.594677130
## 211 -0.387063009
## 212  0.832692918
## 213  0.786562280
## 214 -0.522620080
## 215 -0.855843070
## 216 -0.928260441
## 217 -0.488859668
## 218 -0.472623745
## 219  0.823930674
## 220  1.239621845
## 221 -0.764870359
## 222 -0.641683515
## 223  1.476202437
## 224 -0.685237022
## 225 -1.260710292
## 226 -1.260710292
## 227  0.553074245
## 228  1.983897171
## 229  0.669045123
## 230 -1.184916880
## 231 -0.740903044
## 232 -0.731367661
## 233  0.748936173
## 234  0.926758186
## 235 -0.874398411
## 236 -0.453552979
## 237  1.027266281
## 238 -0.871563567
## 239 -0.844503695
## 240 -0.469531189
## 241  0.091252436
## 242 -0.764870359
## 243 -1.128555033
## 244 -0.529578332
## 245  1.249414941
## 246 -1.012919182
## 247 -1.127756123
## 248 -0.258206477
## 249 -1.108221473
## 250 -0.759458384
## 251  0.322163341
## 252  2.287998585
## 253 -0.550195377
## 254  1.826692202
## 255  0.444061620
## 256 -0.936764972
## 257 -0.506899583
## 258 -0.719512860
## 259 -0.522620080
## 260 -0.028584138
## 261 -0.403556645
## 262 -0.555091926
## 263  0.823415248
## 264 -0.727244252
## 265  1.839577855
## 266  1.149679986
## 267 -0.984699602
## 268 -0.520558375
```

```
## 269 -0.935734120
## 270  1.029327985
## 271 -0.208467856
## 272  1.620521752
## 273 -0.422885124
## 274 -0.675186213
## 275  0.484522570
## 276  2.849813062
## 277  0.015227083
## 278  0.105684368
## 279 -1.260710292
## 280 -1.260710292
## 281  1.522590788
## 282 -1.114741613
## 283 -1.041963444
## 284 -0.299182854
## 285  0.421382870
## 286 -0.541433133
## 287  0.404631521
## 288  1.169781605
## 289  2.115330833
## 290  0.046925790
## 291 -1.260710292
## 292 -0.737295061
## 293  0.421125157
## 294 -0.738325913
## 295  2.607562783
## 296  2.530248864
## 297  2.146256400
## 298  1.187048380
## 299 -0.539629142
## 300  1.108703609
## 301  1.230601888
## 302 -0.906612543
## 303 -1.090928926
## 304  0.845320859
## 305  0.404631521
## 306  0.888616653
## 307  1.169266179
## 308 -0.644776071
## 309 -0.342736362
## 310 -0.113629449
## 311  1.355077297
## 312  0.891966923
## 313 -0.446337013
## 314  0.647397226
## 315  0.326286750
## 316 -0.972844801
## 317  1.427236955
## 318  1.927200297
## 319 -0.679051909
## 320 -0.351498606
## 321 -0.011832789
## 322  0.290206921
## 323  0.977012234
## 324 -0.743222462
## 325 -0.975164218
## 326  1.005876097
## 327 -0.772086325
## 328  1.182151832
## 329 -0.579059240
## 330  2.373043896
## 331 -1.260710292
## 332 -0.722089990
## 333 -0.823113511
## 334 -1.130539424
## 335  0.961807163
## 336 -0.447110152
## 337 -1.120282444
## 338 -0.133215642
## 339  0.308762261
## 340  0.339945542
## 341 -0.093785543
```

```
## 342  0.870834452
## 343  0.796097664
## 344 -0.525197210
## 345  0.185833130
## 346 -0.802496466
## 347 -0.647095489
## 348 -0.781106282
## 349 -0.143524164
## 350 -0.159244661
## 351 -0.577255249
## 352  0.788881698
## 353 -0.656888585
## 354 -0.771313185
## 355  1.066180953
## 356 -0.873109845
## 357 -0.757654393
## 358 -0.901715995
## 359  0.646366374
## 360 -0.930322145
## 361  0.291237773
## 362  0.121662578
## 363 -1.260710292
## 364 -0.753530984
## 365 -0.502776174
## 366 -0.592202607
## 367  1.455585392
## 368 -0.991915567
## 369 -1.031165267
## 370  0.953302632
## 371 -0.415669158
## 372 -0.698895815
## 373 -1.040752193
## 374 -0.867182445
## 375 -0.675186213
## 376 -0.964597983
## 377 -0.480612850
## 378 -0.518496671
## 379 -1.174814528
## 380 -0.505868731
## 381 -0.669774239
## 382 -0.777498299
## 383  0.011876813
## 384  0.737081372
## 385 -0.592202607
## 386 -0.632405844
## 387  1.543207833
## 388 -0.801981040
## 389 -0.103836352
## 390 -0.084765586
## 391  0.876504139
## 392 -1.260710292
## 393 -0.816670684
## 394  1.229828748
## 395 -0.776209734
## 396 -1.041473789
## 397 -0.101774648
## 398  0.667756558
## 399  1.581864792
## 400 -1.056163434
## 401 -0.638075532
## 402 -0.539113716
## 403  0.696104995
## 404  1.043502204
## 405 -0.530609185
## 406  0.745585903
## 407  0.130167109
## 408 -0.584728928
## 409  1.038863369
## 410 -0.831102616
## 411 -0.235012301
## 412 -1.180174960
## 413 -1.057761255
## 414 -0.590656328
```

```
## 414 -0.590656528
## 415 -0.548649099
## 416  1.816383680
## 417 -0.519785236
## 418 -0.172388027
## 419  1.999359954
## 420  0.650232070
## 421  0.764141244
## 422 -0.401494940
## 423 -0.800434761
## 424  0.092798715
## 425 -0.652249750
## 426  0.510551590
## 427 -0.800177048
## 428 -0.519269810
## 429 -0.973102514
## 430  1.940085950
## 431 -0.465665493
## 432  1.174935866
## 433 -0.780590856
## 434  1.105868765
## 435 -0.329592995
## 436 -0.556380491
## 437  0.245107135
## 438 -0.648126341
## 439 -1.059719874
## 440 -0.297378863
## 441 -0.500456756
## 442 -0.631117279
## 443  1.011030358
## 444  0.096406698
## 445  1.009999506
## 446 -0.725697973
## 447 -0.656630872
## 448 -1.116597147
## 449 -0.450975848
## 450  0.396642416
## 451 -0.947331207
## 452 -0.085023299
## 453  1.370540081
## 454 -0.645806924
## 455 -0.699153528
## 456  0.164958372
## 457  0.428856549
## 458  0.967476850
## 459 -1.260710292
## 460 -1.212981833
## 461  3.092063341
## 462  0.992732731
## 463 -0.726213399
## 464 -1.004620821
## 465  2.349849720
## 466 -0.539371429
## 467 -1.176670062
## 468  0.351027204
## 469 -0.238877997
## 470 -0.502003035
## 471 -0.522620080
## 472 -0.761004663
## 473 -0.507415009
## 474  0.449731307
## 475 -0.648126341
## 476  0.788108559
## 477 -0.493240790
## 478  1.715875585
## 479 -0.018791042
## 480  0.481172301
## 481  0.228355786
## 482  0.244076283
## 483  1.945240211
## 484 -0.303048550
## 485 -0.961247713
## 486  1.940085950
```

```
## 487 -0.870532715
## 488  3.437398846
## 489 -0.937022685
## 490  0.380148780
## 491  0.739658503
## 492  2.656528265
## 493  1.566402009
## 494 -0.542206272
## 495 -1.022093767
## 496  0.105942081
## 497 -0.480097424
## 498  0.092798715
## 499  1.687527148
## 500  0.903821724
## 501 -0.666166256
## 502 -0.404329784
## 503  1.388579995
## 504  0.270363015
## 505  0.173205190
## 506 -1.094897707
## 507 -1.099639628
## 508 -0.605861399
## 509  2.537980256
## 510  0.924954195
## 511 -0.459222666
## 512 -0.038119521
## 513  0.074758800
## 514 -0.600191712
## 515  1.000206409
## 516  0.507459033
## 517  0.547662271
## 518  2.035439783
## 519  1.471048175
## 520  0.054141755
## 521 -0.689102718
## 522 -0.275988678
## 523 -0.554834212
## 524 -1.260710292
## 525 -1.260710292
## 526 -0.844503695
## 527 -0.736006496
## 528  0.181452008
## 529 -0.700699806
## 530 -1.112035626
## 531 -0.283720070
## 532 -0.909189674
## 533 -0.787806821
## 534  1.024173724
## 535  1.700412801
## 536 -0.467469484
## 537 -0.673639935
## 538 -0.964855696
## 539 -0.650188046
## 540 -0.397371531
## 541  0.128363117
## 542 -0.636786967
## 543 -1.185354992
## 544  2.615294175
## 545  2.873007238
## 546 -0.392217270
## 547 -0.665908543
## 548 -0.801723327
## 549 -0.151513269
## 550 -0.552257082
## 551 -0.779560003
## 552 -0.881614376
## 553  0.940932405
## 554 -0.116464292
## 555 -0.727759678
## 556  2.764767751
## 557 -0.727501965
## 558  0.362882005
## 559 -0.595037450
```

```
## 560 -0.678278770
## 561  0.181967434
## 562 -0.824659789
## 563 -0.813062702
## 564 -0.384485878
## 565 -0.521073801
## 566 -0.735748783
## 567 -0.419792568
## 568  0.413136052
## 569  1.973588648
```

```
colnames(matstand.all) <- colnames(cancer[2:10])
t2testcan <- hotelling.test(radius_mean + texture_mean + perimeter_mean + area_mean + smoothness_mean + comp
actness_mean + concavity_mean + points_mean + symmetry_mean + dimension_mean ~ diagnosis, data=cancer)
cat("T2 statistic =",t2testcan$stat[[1]],"\n")
```

```
## T2 statistic = 1220.313
```

```
print(t2testcan)
```

```
## Test stat:  120.09
## Numerator df:  10
## Denominator df:  558
## P-value:  0
```

```
# In the above we standardized using scale function
matabsdev.all
```

```
##     cancer.diagnosis radius_mean texture_mean perimeter_mean    area_mean
## 1                  B 0.034051742  1.162510676    0.027573173 0.0161971331
## 2                  B 0.454023221  0.362703331    0.366270503 0.3182594580
## 3                  B 0.329166835  0.130201196    0.298777961 0.2421045162
## 4                  B 0.261063352  0.930008541    0.213177663 0.2091419295
## 5                  B 0.848455895  0.971858925    0.801268167 0.7200620236
## 6                  B 0.178771643  0.383628523    0.163792876 0.1383860322
## 7                  B 0.195797514  1.520563965    0.150623600 0.1560039664
## 8                  M 0.485237318  0.441754057    0.443228462 0.3475279617
## 9                  B 0.323491545  0.564980189    0.275320187 0.2401153946
## 10                 B 0.014188226  0.127876174    0.003703859 0.0053990444
## 11                 M 0.266738642  0.778882153    0.321001115 0.2230657808
## 12                 B 0.241199836  0.446404100    0.182312172 0.1955022385
## 13                 B 0.678197187  1.229936296    0.749414141 0.5646263776
## 14                 B 0.996013442  0.804457388    0.980288020 0.8618579786
## 15                 M 0.133369321  0.020925192    0.126342746 0.0895104725
## 16                 B 0.002837645  0.953258755    0.037038590 0.0073881660
## 17                 B 0.139044612  0.046500427    0.144038962 0.1082650478
## 18                 B 0.144719902  1.639140054    0.074488720 0.1477633198
## 19                 M 0.357543287  0.279002562    0.320589575 0.2511976436
## 20                 B 0.822917089  0.232502135    0.880695366 0.6140702577
## 21                 B 0.479562027  0.651005979    0.392609056 0.3529270061
## 22                 B 0.354705642  0.211576943    0.346516588 0.2747829427
## 23                 B 0.736085147  0.127876174    0.680686979 0.5055210497
## 24                 B 0.340517416  0.102300940    0.300424120 0.2671106165
## 25                 B 0.241199836  0.825382580    0.186427570 0.2051636863
## 26                 M 0.019863516  0.123226132    0.009465417 0.0218803377
## 27                 B 0.675359542  0.867232965    0.662990764 0.5694571016
## 28                 M 0.414296189  0.520804783    0.415243750 0.3472438014
## 29                 B 0.085129354  0.637055851    0.002880779 0.0727450190
## 30                 B 0.224173966  0.734706747    0.242808535 0.1588455687
## 31                 B 0.482399673  0.179026644    0.444051542 0.4006659247
## 32                 M 0.303628029  0.179026644    0.317297256 0.2196558580
## 33                 M 0.371731512  0.348753203    0.408247572 0.2833077496
## 34                 B 0.073778773  0.581255338    0.092596475 0.0366566697
## 35                 B 0.794540637  0.437104014    0.793037369 0.6424862807
## 36                 B 0.113505805  0.030225278    0.120169648 0.0753024610
## 37                 M 0.573204317  2.431972335    0.591382823 0.4702851812
## 38                 B 0.323491545  0.355728267    0.341989649 0.1750427019
## 39                 M 0.130531676  0.627755765    0.076957960 0.0920679146
## 40                 M 0.601580768  0.530104868    0.593440522 0.4003817645
```

```
## 40                M 0.601580768  0.550104868    0.595440522 0.4005617645
## 41                M 0.039727032  1.122985313    0.068727162 0.0173337740
## 42                M 0.303628029  0.086025790    0.262150910 0.2500610027
## 43                M 0.683872477  0.395253630    0.596732841 0.5867908756
## 44                B 0.468211447  0.513829719    0.444874622 0.3665666971
## 45                B 0.150395192  0.611480616    0.122227348 0.1199156172
## 46                M 0.610093704  0.032550299    0.566690429 0.4194204999
## 47                B 0.896128333  0.351078224    0.745298742 0.6078187326
## 48                M 1.603269500  0.967208883    1.498828282 1.5165631492
## 49                B 1.316667342  0.481279420    1.243673550 1.1985878515
## 50                B 0.045402322  1.025334417    0.065846383 0.0218803377
## 51                M 0.252550417  0.383628523    0.262562450 0.1827150281
## 52                B 0.158908127  0.934658584    0.169142895 0.1298612253
## 53                B 0.786027702  0.102300940    0.742417963 0.6464645240
## 54                B 0.028376451  0.346428182    0.026750093 0.0150604922
## 55                M 0.312140965  0.971858925    0.290547163 0.2492085220
## 56                B 0.692385412  0.499879591    0.723898668 0.5498500457
## 57                B 0.263900997  1.029984459    0.206593025 0.2048795261
## 58                B 0.195797514  0.992784118    0.152681299 0.1633921324
## 59                M 0.039727032  1.190410933    0.031277032 0.0287001833
## 60                M 0.334842126  3.099253463    0.335816551 0.2807503076
## 61                M 0.428484415  0.299927755    0.434174585 0.3199644193
## 62                M 0.173096353  1.006734246    0.127988906 0.1432167561
## 63                M 0.076616419  0.018600171    0.093419555 0.0616627700
## 64                M 0.227011611  1.799566527    0.182312172 0.1756110223
## 65                M 0.215661030  0.209251922    0.246923934 0.1898190339
## 66                B 0.099317580  0.016275149    0.108646531 0.0730291792
## 67                B 0.573204317  0.032550299    0.537471097 0.4128848147
## 68                B 0.422809125  0.697506406    0.357216625 0.3225218614
## 69                B 0.703735993  0.192976772    0.718137109 0.4839248722
## 70                B 0.258225707  1.011384288    0.244866235 0.2000488021
## 71                M 0.283764513  0.009300085    0.244866235 0.2364213116
## 72                B 0.201472804  0.651005979    0.172435214 0.1520257232
## 73                B 0.102155225  0.390603587    0.153915919 0.0778599031
## 74                B 0.005675290  0.616130658    0.053088646 0.0150604922
## 75                B 0.391595028  1.585664563    0.382320558 0.2750671029
## 76                B 0.295115094  0.934658584    0.297543341 0.2219291399
## 77                M 0.158908127  0.218552007    0.123873507 0.1304295457
## 78                B 1.129666527  0.769582068    1.025145868 0.7231877862
## 79                B 0.124856386  0.978833990    0.142392802 0.0866688702
## 80                M 0.241199836  0.279002562    0.284374064 0.1523098834
## 81                B 0.468211447  0.041850384    0.422239928 0.3702607801
## 82                B 0.170258708  1.650765160    0.162558257 0.1170740149
## 83                B 0.207148095  0.316202904    0.212354584 0.1582772483
## 84                B 0.209985740  0.179026644    0.188896810 0.1571406074
## 85                B 0.414296189  0.404553715    0.464216997 0.3321833092
## 86                B 0.286602158  2.480797783    0.275731727 0.2273281843
## 87                B 0.323491545  0.062775577    0.285197144 0.2611432517
## 88                B 0.983527803  0.127876174    0.942837890 0.6368030761
## 89                M 0.039727032  1.081134929    0.055146345 0.0278477026
## 90                B 0.073778773  0.197626815    0.101650353 0.0591053279
## 91                B 0.110668160  0.000000000    0.119758108 0.0838272679
## 92                B 1.220187407  0.209251922    1.169596369 1.0789563945
## 93                M 0.065265838  0.090675833    0.017284675 0.0537062835
## 94                B 0.045402322  0.267377456    0.034157811 0.0235852991
## 95                M 0.082291709  0.125551153    0.041565529 0.0659251734
## 96                M 0.697493174  0.402228694    0.668752322 0.4793783085
## 97                B 0.198635159  0.341778139    0.228816179 0.1528782039
## 98                B 0.533477285  0.241802221    0.529651839 0.3793539075
## 99                B 0.627119574  0.544054997    0.734598705 0.5472926036
## 100               M 0.784325115  0.216226986    0.755587239 0.5109200941
## 101               B 0.394432673  0.104625961    0.331701152 0.3236585023
## 102               B 0.462536157  0.216226986    0.467509316 0.3338882706
## 103               B 0.366056222  1.141585484    0.359274325 0.2915483963
## 104               M 0.303628029  0.611480616    0.269970168 0.2651214949
## 105               B 0.266738642  0.597530488    0.183546791 0.1827150281
## 106               B 0.473886737  0.274352520    0.425532247 0.3844687916
## 107               B 0.908046443  0.695181384    0.897980041 0.6027038485
## 108               B 0.607256058  0.911408370    0.589736663 0.5194449010
## 109               B 0.269576288  0.476629377    0.293427942 0.2287489854
## 110               B 0.436997350  0.120901110    0.409070651 0.3597468516
## 111               B 0.394432673  1.034634502    0.369562822 0.2915483963
## 112               B 0.187284579  0.141826303    0.206181485 0.1361127503
```

```
## 113              M 0.323491545  0.595205466    0.323881894 0.2278965047
## 114              M 0.005675290  0.727731683    0.039507830 0.0008524807
## 115              B 0.008512935  0.504529634    0.014815436 0.0073881660
## 116              M 0.445510286  0.957908797    0.406601412 0.3532111663
## 117              M 0.278089223  0.574280274    0.256800892 0.2020379238
## 118              M 0.366056222  1.171810762    0.372032061 0.2690997381
## 119              M 0.697493174  0.399903673    0.686448538 0.4788099881
## 120              B 0.076616419  1.506613837    0.083954138 0.0446131562
## 121              B 0.771839476  0.571955253    0.751883380 0.6493061263
## 122              M 0.686710122  1.541489157    0.674513881 0.5805393505
## 123              B 0.357543287  0.316202904    0.381085939 0.2634165335
## 124              M 0.002837645  0.767257046    0.024692393 0.0102297683
## 125              B 0.397270319  1.067184801    0.386435957 0.2798978269
## 126              B 0.791702992  1.097410079    0.796329688 0.6686290219
## 127              M 0.122018741  0.783532196    0.163381337 0.0625152507
## 128              M 0.139044612  0.451054142    0.129635066 0.1082650478
## 129              M 0.170258708  0.225527071    0.176962153 0.1298612253
## 130              M 0.368893867  1.088109993    0.309066458 0.3063247283
## 131              M 0.195797514  0.392928609    0.242808535 0.1653812540
## 132              B 0.306465674  0.853282836    0.313181857 0.2369896321
## 133              B 0.374569158  0.411528779    0.319766495 0.2827394292
## 134              M 0.576041962  0.583580360    0.560928871 0.4162947374
## 135              B 0.156070482  0.160426473    0.178196773 0.1005927215
## 136              M 0.567529027  0.730056705    0.585621264 0.4546563685
## 137              B 0.147557547  0.839332708    0.148154361 0.0957619976
## 138              B 0.141882257  1.213661146    0.111115770 0.1040026443
## 139              M 0.212823385  0.832357644    0.179842932 0.1616871711
## 140              B 0.436997350  0.520804783    0.439936143 0.3091663306
## 141              M 1.022403541  0.281327584    0.991399597 0.6740280663
## 142              M 0.716221632  0.988134075    0.578625086 0.5282538682
## 143              M 0.269576288  0.606830573    0.279847126 0.1943655975
## 144              M 0.161745773  2.766775410    0.136219704 0.1230413797
## 145              M 0.039727032  0.567305210    0.004526939 0.0304051446
## 146              B 0.584554897  0.525454826    0.808675885 0.4873347950
## 147              M 0.161745773  2.799325709    0.130458145 0.1406593140
## 148              B 0.147557547  0.283652605    0.110704231 0.1076967273
## 149              B 1.029781419  0.997434160    0.973291841 0.6737439061
## 150              B 0.439834996  1.820491719    0.418536069 0.3165544966
## 151              B 0.488074963  0.574280274    0.471624715 0.3429813980
## 152              B 0.985797919  0.362703331    0.919380116 0.6464645240
## 153              B 0.795391931  0.997434160    0.758468018 0.5387677967
## 154              B 0.714235280  0.453379164    0.704967833 0.4907447178
## 155              B 0.615768994  0.904433306    0.616898296 0.4293661080
## 156              B 0.644145445  1.767016228    0.725544827 0.5626372560
## 157              B 1.136193111  0.127876174    1.089346091 0.7288709908
## 158              M 0.056752903  2.520323146    0.058027125 0.0451814766
## 159              B 0.805891218  0.151126388    0.845714475 0.6564101320
## 160              B 0.263900997  0.439429036    0.197539148 0.1886823929
## 161              B 0.493750253  0.981159011    0.499197887 0.3858895928
## 162              B 0.793121815  1.002084203    0.764641117 0.5319479512
## 163              B 0.661171316  0.453379164    0.661344604 0.5720145436
## 164              B 0.238362191  0.041850384    0.234166198 0.1665178950
## 165              M 0.164583418  0.209251922    0.131281225 0.1253146616
## 166              M 0.380244448  0.704481470    0.381909019 0.3066088885
## 167              B 0.028376451  0.076725705    0.004526939 0.0346675481
## 168              M 0.541990220  2.376171823    0.514836403 0.3892995155
## 169              B 0.482399673  0.430128950    0.434174585 0.4106115328
## 170              B 0.567529027  0.020925192    0.540351876 0.3898678360
## 171              M 0.939828068  0.639380872    0.797975848 0.6092395338
## 172              M 0.014188226  1.174135783    0.000000000 0.0230169787
## 173              M 0.170258708  0.016275149    0.200419927 0.1417959549
## 174              B 0.527801995  0.048825448    0.476151654 0.4282294671
## 175              M 0.031214096  0.202276858    0.041565529 0.0355200288
## 176              B 0.757651250  0.655656021    0.738302564 0.6322565125
## 177              M 0.380244448  0.950933733    0.397959074 0.2781928655
## 178              B 1.268711139  1.883267296    1.242850470 0.7945120040
## 179              M 0.266738642  0.567305210    0.283139445 0.1997646419
## 180              B 0.039727032  0.351078224    0.062554063 0.0372249902
## 181              B 0.408620899  0.416178822    0.378616699 0.3321833092
## 182              M 0.692385412  0.125551153    0.659698445 0.5899166381
## 183              B 0.127694031  0.181351666    0.185604491 0.0772915826
## 184              M 0.788014053  2.438947399    0.778633473 0.5316637909
## 185              B 0.422809125  0.306902819    0.397547534 0.3429813980
```

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## 186              B 0.002837645  0.146476345    0.005350019 0.0000000000
## 187              M 0.036889387  0.918383434    0.014403896 0.0375091504
## 188              M 0.584554897  0.181351666    0.536648017 0.4964279224
## 189              M 0.368893867  1.029984459    0.390551356 0.2602907710
## 190              B 0.209985740  0.283652605    0.205769945 0.1398068333
## 191              M 0.780352412  0.320852947    0.809087425 0.6566942923
## 192              B 0.385919738  0.811432452    0.428413026 0.2924008770
## 193              B 0.425646770  0.058125534    0.394255215 0.3202485796
## 194              M 0.087966999  0.006975064    0.081484898 0.0647885325
## 195              M 0.357543287  2.515673104    0.317297256 0.2946741588
## 196              M 0.303628029  1.174135783    0.275320187 0.2273281843
## 197              M 0.726437154  0.616130658    0.686860078 0.5975889644
## 198              B 0.070941128  0.227852093    0.192189129 0.0520013221
## 199              B 0.076616419  0.962558840    0.067904082 0.0562637256
## 200              B 0.062428193  0.546380018    0.017696215 0.0514330017
## 201              M 0.519289059  0.897458242    0.477797813 0.4120323340
## 202              B 0.227011611  0.788182239    0.219350762 0.1733377405
## 203              B 0.698628232  1.260161573    0.697148575 0.4827882313
## 204              B 0.190122224  0.499879591    0.184781411 0.1443533970
## 205              B 0.397270319  1.785616399    0.387259037 0.2864335122
## 206              M 0.005675290  0.769582068    0.038273210 0.0085248069
## 207              B 0.871157056  1.041609566    0.822668241 0.7589919752
## 208              M 0.096479935  0.158101452    0.051030946 0.0951936772
## 209              B 0.899817272  0.013950128    0.797975848 0.5907691188
## 210              M 1.001688732  1.420588047    1.013211211 0.8206547452
## 211              B 1.118032182  0.588230402    1.074942194 0.9706913468
## 212              M 0.255388062  0.186001708    0.174904454 0.1960705589
## 213              M 0.687561416  0.093000854    0.645294549 0.4779575074
## 214              B 0.942665713  0.441754057    0.882341526 0.6177643407
## 215              B 0.218498675  0.018600171    0.186016031 0.1716327791
## 216              B 0.059590548  1.743766015    0.023457774 0.0485913994
## 217              B 0.516451414  0.402228694    0.469567015 0.4208413011
## 218              B 0.192959869  2.680749620    0.177785233 0.1588455687
## 219              M 0.244037481  0.899783264    0.234577738 0.1758951826
## 220              M 0.776095944  0.841657730    0.743652582 0.5370628353
## 221              B 0.659468729  0.027900256    0.628009873 0.4631811754
## 222              B 0.102155225  0.360378310    0.109881151 0.0863847100
## 223              M 0.813552860  1.057884716    0.788921970 0.5524074877
## 224              B 0.019863516  2.924876862    0.031277032 0.0198912161
## 225              B 0.550503156  1.202036039    0.511544084 0.3887311951
## 226              B 0.005675290  0.104625961    0.016050056 0.0207436968
## 227              B 0.187284579  0.685881299    0.145273581 0.1577089278
## 228              M 0.693804235  2.513348082    0.679040820 0.4759683858
## 229              M 0.187284579  1.550789242    0.183135251 0.1400909935
## 230              B 0.096479935  0.248777285    0.126342746 0.0508646812
## 231              B 0.858955182  0.820732538    0.781102712 0.5612164549
## 232              B 0.028376451  0.378978481    0.012346197 0.0170496138
## 233              B 0.011350581  0.148801367    0.004526939 0.0088089671
## 234              M 0.119181096  0.055800512    0.100415733 0.0980352795
## 235              B 0.073778773  1.060209737    0.026750093 0.0537062835
## 236              B 0.720761864  1.866992146    0.679863899 0.5973048041
## 237              M 0.053915258  0.020925192    0.101238813 0.0127872104
## 238              B 0.246875127  0.750981897    0.262973990 0.1756110223
## 239              B 0.192959869  0.571955253    0.177373693 0.1480474800
## 240              B 0.468211447  0.513829719    0.432116885 0.3813430291
## 241              M 0.479562027  1.325262171    0.466274696 0.3529270061
## 242              B 0.244037481  0.283652605    0.223054621 0.1909556748
## 243              B 0.550503156  0.188326730    0.507428685 0.3910044769
## 244              M 0.485237318  0.283652605    0.465863156 0.3526428458
## 245              M 1.163434505  0.392928609    1.091403790 1.0269550724
## 246              B 0.283764513  2.785375581    0.309066458 0.2057320067
## 247              B 0.408620899  0.244127242    0.371620521 0.3222377012
## 248              B 0.419971480  0.246452263    0.394255215 0.3327516297
## 249              B 0.476724382  0.285977626    0.419359149 0.3927094383
## 250              B 0.167421063  0.318527925    0.111938850 0.1426484356
## 251              B 0.684723771  0.592880445    0.661344604 0.4657386175
## 252              M 0.667697900  0.397578651    0.624717554 0.4694327005
## 253              B 0.332004481  0.232502135    0.325939593 0.2702363790
## 254              M 0.295115094  0.637055851    0.357628165 0.2401153946
## 255              B 1.126545118  0.306902819    1.157250173 0.9380129203
## 256              B 0.224173966  1.527539029    0.199185307 0.1565722869
## 257              B 0.747151964  0.344103160    0.739537184 0.5080784918
## 258              B 0.195797514  0.762607004    0.278612506 0.1528782039
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## 258                B 0.195797514  0.762607004    0.278612506 0.1528782039
## 259                B 0.249712772  2.252945691    0.264208610 0.1781684644
## 260                B 0.411458544  0.562655167    0.408247572 0.2929691975
## 261                B 0.139044612  0.167401537    0.142392802 0.0988877602
## 262                B 0.130531676  0.783532196    0.162146717 0.0883738316
## 263                M 0.218498675  0.465004271    0.210708424 0.1665178950
## 264                B 0.629957220  0.197626815    0.657229205 0.5194449010
## 265                M 0.700614583  0.476629377    0.592617443 0.4495414844
## 266                M 0.297952739  1.002084203    0.300835660 0.2173825762
## 267                B 0.831997553  1.050909651    0.686860078 0.5958840030
## 268                B 0.224173966  0.574280274    0.191366049 0.1602663699
## 269                B 0.070941128  0.564980189    0.039096290 0.0900787930
## 270                M 0.754813605  0.104625961    0.687683157 0.6117969759
## 271                B 0.578879607  0.511504698    0.553521153 0.4168630579
## 272                M 0.056752903  0.404553715    0.050619407 0.0429081948
## 273                B 0.349030351  0.044175406    0.265443229 0.2469352401
## 274                B 0.541990220  1.048584630    0.487674770 0.4492573241
## 275                M 0.201472804  0.246452263    0.179019852 0.1648129336
## 276                M 1.016444487  1.302011958    0.981111099 0.6646507787
## 277                B 0.127694031  0.648680957    0.085600297 0.1096858489
## 278                M 0.221336320  0.455704185    0.260916291 0.1579930881
## 279                B 0.402945609  1.357812470    0.370797441 0.3262159444
## 280                B 0.360380932  0.774232110    0.376147460 0.2497768424
## 281                M 0.765029128  1.150885570    0.734187165 0.5242756249
## 282                B 0.439834996  1.483363623    0.426355327 0.3739548631
## 283                B 0.048239967  0.125551153    0.086011837 0.0352358686
## 284                B 0.087966999  0.223202050    0.035392431 0.0744499803
## 285                M 0.499425543  0.448729121    0.475740114 0.3659983766
## 286                B 0.093642289  0.964883861    0.055557885 0.0750183008
## 287                M 0.087966999  0.878858071    0.073665640 0.0699034167
## 288                M 0.635632510  0.513829719    0.649821487 0.5163191385
## 289                M 0.377406803  1.499638773    0.400428314 0.2864335122
## 290                B 1.001404967  0.683556278    0.977818780 0.6569784525
## 291                B 0.229849256  1.122985313    0.157619778 0.1932289566
## 292                B 0.329166835  0.571955253    0.309066458 0.2435253174
## 293                M 0.448347931  0.372003416    0.419359149 0.3623042937
## 294                B 0.056752903  0.067425619    0.135396624 0.0267110616
## 295                M 0.283764513  0.365028352    0.242396996 0.2242024217
## 296                M 0.553340801  0.281327584    0.479855513 0.3813430291
## 297                M 0.522126704  0.327828011    0.477386273 0.4341968319
## 298                M 0.161745773  0.934658584    0.158031318 0.1392385129
## 299                B 0.786027702  0.551030061    0.712787091 0.6586834139
## 300                M 0.235524546  0.239477199    0.182312172 0.1858407906
## 301                M 0.045402322  2.499397954    0.054734805 0.0241536196
## 302                B 0.042564677  1.239236381    0.023457774 0.0301209844
## 303                B 0.783190057  0.397578651    0.775752694 0.6504427672
## 304                M 0.652658381  1.511263879    0.662579224 0.5180240999
## 305                M 0.651523323  0.155776431    0.558871172 0.4432899593
## 306                M 0.153232837  0.074400683    0.184369871 0.1062759261
## 307                M 0.718775512  0.255752349    0.686860078 0.4810832699
## 308                B 0.272413933  0.732381726    0.241985456 0.2281806649
## 309                B 0.351867996  0.053475491    0.304127979 0.2637006937
## 310                B 1.022119777  0.834682666    0.967941823 0.6723231049
## 311                M 0.192959869  0.192976772    0.258035511 0.0986035999
## 312                M 0.659468729  0.467329292    0.585621264 0.4549405287
## 313                B 0.462536157  0.657981043    0.330466532 0.3412764366
## 314                B 0.164583418  0.183676687    0.074077180 0.1409434742
## 315                M 0.278089223  3.817685061    0.304127979 0.2034587249
## 316                B 0.593067833  0.132526217    0.498786347 0.4950071212
## 317                M 0.740625380  0.625430744    0.678217740 0.6316881920
## 318                M 0.249712772  0.390603587    0.306597219 0.1750427019
## 319                B 0.411458544  0.983484032    0.399193694 0.3139970545
## 320                B 0.258225707  1.197385997    0.363801263 0.2017537635
## 321                B 0.488074963  0.560330146    0.439936143 0.3546319674
## 322                M 0.076616419  0.281327584    0.119758108 0.0667776541
## 323                M 1.259914439  1.662390267    1.245319709 0.7882604789
## 324                B 1.480966995  0.920708456    1.415285684 0.8948205653
## 325                B 0.190122224  0.274352520    0.172846754 0.1528782039
## 326                M 0.119181096  1.529864050    0.130458145 0.1079808875
## 327                B 0.235524546  0.348753203    0.247335474 0.1773159837
## 328                M 0.718491748  0.165076516    0.704556293 0.4890397564
## 329                B 0.073778773  0.783532196    0.012757737 0.0494438801
## 330                M 1.279494190  1.871642189    1.228035034 0.8183814633
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## 331              B 0.147557547  0.065100598    0.115231169 0.1219047388
## 332              B 0.178771643  0.385953545    0.193835289 0.1378177117
## 333              B 0.192959869  0.316202904    0.199185307 0.1403751538
## 334              B 0.141882257  0.399903673    0.158442858 0.1128116114
## 335              M 0.473886737  0.769582068    0.476974733 0.3591785311
## 336              B 0.170258708  1.057884716    0.158031318 0.1301453855
## 337              B 0.824335911  0.811432452    0.749825681 0.5700254220
## 338              B 0.107830515  0.234827157    0.067904082 0.0869530305
## 339              M 0.212823385  0.318527925    0.204123786 0.1571406074
## 340              B 0.922234668  0.378978481    0.800033547 0.6058296110
## 341              B 0.158908127  0.337128096    0.151858220 0.1085492080
## 342              M 0.524964350  2.269220840    0.543232656 0.4035075270
## 343              M 0.042564677  0.641705893    0.005761558 0.0258585810
## 344              B 0.184446934  0.925358498    0.183135251 0.1594138892
## 345              M 0.300790384  0.771907089    0.285608684 0.2097102500
## 346              B 0.127694031  0.039525363    0.094242635 0.1008768818
## 347              B 0.286602158  1.827466783    0.243631615 0.2259073831
## 348              B 0.198635159  0.246452263    0.201654546 0.1449217175
## 349              M 0.706573638  0.792832281    0.824725941 0.5617847753
## 350              B 0.317816255  0.623105723    0.327997293 0.2435253174
## 351              B 0.737787735  0.062775577    0.728425606 0.6149227384
## 352              M 0.000000000  0.506854655    0.006996178 0.0014208012
## 353              B 0.624281929  2.232020499    0.579036626 0.5333687523
## 354              B 0.187284579  0.946283691    0.190954509 0.1318503469
## 355              M 0.275251578  0.192976772    0.251039333 0.2242024217
## 356              B 0.550503156  0.623105723    0.493024789 0.3887311951
## 357              B 0.661171316  0.792832281    0.645294549 0.5279697079
## 358              B 0.997432264  0.532429890    0.931726312 0.9496634897
## 359              M 0.926491136  0.051150470    0.971234142 1.1025416936
## 360              B 0.642726623  0.823057559    0.555578852 0.7359749965
## 361              M 0.784608879  0.558005125    0.843656776 0.8951047255
## 362              M 1.000269909  1.318287107    0.978230320 0.9885934413
## 363              B 0.574623139  0.885833135    0.485617071 0.5671838197
## 364              B 1.292547358  0.234827157    1.336681565 1.2096701005
## 365              B 0.078035241  0.434778993    0.197539148 0.1378177117
## 366              B 0.458279689  0.034875320    0.386847497 0.5626372560
## 367              M 0.154651660  0.618455680    0.201654546 0.1298612253
## 368              B 0.307884497  0.625430744    0.222231541 0.3605993323
## 369              B 0.847037072  1.302011958    0.769579596 1.0116104199
## 370              M 0.642726623  0.769582068    0.679040820 0.8013318495
## 371              B 1.675629451  0.251102306    1.507059080 1.5512306973
## 372              B 0.214242208  0.088350811    0.131692765 0.2614274119
## 373              B 2.385040734  0.930008541    2.469239344 3.0632472828
## 374              B 0.983244039  1.053234673    0.956418706 1.0033697732
## 375              B 1.692655322  1.211336125    1.839583311 2.1397265343
## 376              B 1.965069255  0.292952690    2.140007431 2.3556883093
## 377              B 0.588811365  0.762607004    0.535001858 0.6052612906
## 378              B 0.495169076  0.778882153    0.580271246 0.4887555961
## 379              B 0.041145854  0.748656876    0.078192579 0.1494682811
## 380              B 0.026957629  0.953258755    0.012346197 0.0454656369
## 381              B 1.102425134  0.027900256    1.153134774 1.0485512499
## 382              B 0.563272559  1.674015374    0.481501672 0.6467486842
## 383              M 1.091074554  0.148801367    1.061772918 1.0593493386
## 384              M 0.279508046  0.669606150    0.181077552 0.3097346510
## 385              B 0.188703401  0.186001708    0.148154361 0.1696436575
## 386              B 1.088236908  0.367353374    0.946541749 1.3412362871
## 387              M 0.486656140  0.483604441    0.584386645 0.4927338394
## 388              B 0.881088814  0.385953545    0.816083603 0.9152801019
## 389              M 0.367475045  1.383387705    0.345693508 0.3944143997
## 390              B 2.240320832  0.802132367    2.358123574 2.6881557788
## 391              M 0.750557138  0.309227840    0.800856627 0.7032965700
## 392              B 0.378825625  1.009059267    0.296308721 0.4120323340
## 393              B 1.020133425  0.267377456    0.847772175 1.0050747346
## 394              M 0.015607048  0.920708456    0.074077180 0.0090931274
## 395              B 0.815822976  0.288302648    0.811145125 0.8220755463
## 396              B 0.520707882  0.346428182    0.485617071 0.5322321114
## 397              B 0.702317170  0.023250214    0.637886831 0.8467974863
## 398              M 0.923653491  0.158101452    0.843656776 1.0172936245
## 399              M 1.244307391  0.978833990    1.098811508 1.7447438141
## 400              B 1.196067424  1.371762598    1.110746165 1.1417558054
## 401              B 0.773258299  0.425478908    0.832545199 0.7595602956
## 402              B 0.475305560  0.592880445    0.378616699 0.5853700745
## 403              M 0.866900588  0.253427327    0.840775997 0.8587322160
```

```
## 404              M 0.688128945  0.248777285    0.497963268 0.7018757689
## 405              B 1.201742714  0.216226986    1.144080896 1.5543564598
## 406              M 0.191541046  0.018600171    0.172846754 0.0778599031
## 407              B 0.075197596  0.106950982    0.098769574 0.0380774709
## 408              B 0.364637400  0.281327584    0.325116514 0.4603395731
## 409              M 0.188703401  2.576123659    0.353924306 0.1960705589
## 410              B 0.795959460  1.578689499    0.699617814 0.9348871577
## 411              B 0.872575878  0.160426473    0.731717926 0.8135507394
## 412              B 0.778933589  0.016275149    0.690975476 0.8161081815
## 413              B 0.438416173  0.830032623    0.436232284 0.4290819478
## 414              B 1.808998772  0.025575235    1.740813738 1.5938547318
## 415              B 1.635902419  0.378978481    1.559736186 2.1312017274
## 416              M 2.807849859  0.095325875    2.794355858 3.7452318356
## 417              B 0.009931758  0.155776431    0.008230798 0.0448973164
## 418              B 1.179041553  0.651005979    1.161365571 1.1292527553
## 419              M 0.949192297  0.427803929    0.949834068 0.9448327658
## 420              M 1.025808716  0.146476345    0.987695738 1.0062113756
## 421              B 1.105262779  0.425478908    1.167127130 1.0417314043
## 422              M 0.534896108  0.671931171    0.465040076 0.6251525067
## 423              B 0.375987980  0.897458242    0.390962896 0.4091907317
## 424              B 0.356124464  0.420828865    0.415655290 0.3247951433
## 425              B 0.625700752  1.111360207    0.634594511 0.6120811361
## 426              M 0.078035241  0.553355082    0.032923191 0.1051392852
## 427              B 0.319235077  0.104625961    0.246923934 0.4063491294
## 428              B 0.804472395  0.418503843    0.695502415 0.9718279877
## 429              B 0.344773884  0.792832281    0.374501301 0.3381506741
## 430              M 0.790284170  1.413612982    0.718960189 0.7763257492
## 431              M 0.461117334  0.267377456    0.535001858 0.4700010209
## 432              M 0.503682011  1.122985313    0.613194437 0.5683204606
## 433              B 0.637051332  0.995109139    0.666694623 0.6120811361
## 434              M 0.662590139  0.869557986    0.767933436 0.6626616571
## 435              B 0.529220817  0.578930317    0.428001486 0.5703095822
## 436              B 1.579149516  0.771907089    1.613236371 1.4233585937
## 437              M 1.068373393  1.188085911    1.172888688 1.0769672729
## 438              B 0.742044202  0.030225278    0.767521896 0.7817247936
## 439              B 0.035470564  0.711456534    0.000000000 0.0073881660
## 440              B 1.383352002  1.339212299    1.301700674 1.2926448877
## 441              B 1.686980032  0.134851238    1.559736186 2.1425681366
## 442              B 0.625700752  0.595205466    0.629656033 0.8098566564
## 443              M 0.810147685  0.446404100    0.806618186 0.9036295324
## 444              B 0.061009370  0.497554569    0.037038590 0.0556954051
## 445              M 0.299371562  0.174376601    0.300424120 0.3361615525
## 446              B 0.699479525  0.406878737    0.567925049 0.7405215602
## 447              B 0.954867587  1.025334417    0.937076331 0.9365921191
## 448              B 0.007094113  0.372003416    0.131692765 0.0031257625
## 449              B 0.682453654  0.381303502    0.679040820 0.7785990311
## 450              M 0.472467915  0.404553715    0.164615956 0.4503939651
## 451              B 0.166002240  0.102300940    0.419770688 0.1761793428
## 452              M 0.529220817  0.460354228    0.514424863 0.5202973817
## 453              M 0.086548177  0.585905381    0.057615585 0.0929203953
## 454              B 1.227281520  0.083700769    1.098811508 1.1713084694
## 455              B 0.588811365  0.474304356    0.613194437 0.6336773136
## 456              B 0.523545527  0.776557132    0.749002601 0.5427460399
## 457              B 0.526383172  0.239477199    0.547348055 0.6137860975
## 458              M 3.060400276  0.695181384    3.057741388 4.4527908091
## 459              B 0.205729272  1.539164136    0.242808535 0.2099944102
## 460              B 0.205729272  1.234586338    0.246923934 0.2102785704
## 461              M 0.038308209  0.141826303    0.107000372 0.0105139285
## 462              M 0.889601749  0.546380018    0.877814587 0.9130068200
## 463              B 0.727855977  0.279002562    0.670810022 0.8013318495
## 464              B 1.025808716  0.488254484    1.016503530 1.2275721950
## 465              M 1.008782845  0.192976772    0.969999522 0.9749537502
## 466              B 1.329436745  0.102300940    1.358081639 1.5628812667
## 467              B 2.072899770  0.032550299    2.111199639 2.5830164936
## 468              M 0.915140555  0.139501281    0.971234142 1.0684424660
## 469              B 0.705154816  0.160426473    0.650233027 0.9320455554
## 470              B 0.305046852  0.453379164    0.181077552 0.3301941876
## 471              B 0.529220817  1.283411787    0.497963268 0.6393605182
## 472              B 1.113775715  0.218552007    1.051895961 1.0664533444
## 473              B 0.446929108  0.281327584    0.477386273 0.4850615132
## 474              M 0.903789975  1.476388559    0.831310579 1.0997000913
## 475              B 0.597324300  2.129719559    0.444463082 0.6112286554
## 476              M 0.892439394  0.183676687    0.843656776 1.0428680453
```

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## 476                M 0.892439594  0.185076687    0.845656770 1.042660455
## 477                B 0.007094113  1.018359353    0.049384787 0.0107980888
## 478                M 1.147827456  0.274352520    1.106219226 1.0991317709
## 479                B 0.841361782  1.655415203    0.860118371 1.0371848407
## 480                M 1.669954161  1.281086765    1.617351770 2.0971024997
## 481                B 0.166002240  0.030225278    0.168731355 0.1776001439
## 482                M 0.832848847  0.365028352    0.749002601 0.9434119647
## 483                M 0.322072723  0.683556278    0.283962525 0.4063491294
## 484                B 0.438416173  0.337128096    0.349808907 0.4245353841
## 485                B 1.755083515  0.653331000    1.683198153 2.3159058771
## 486                M 0.673940719  0.904433306    0.714021710 0.7214828248
## 487                B 0.410039722  0.006975064    0.358039705 0.4546563685
## 488                M 0.480980850  0.727731683    0.321001115 0.4091907317
## 489                B 0.302209207  0.097650897    0.275731727 0.2989365623
## 490                M 0.330585658  0.018600171    0.329231913 0.3472438014
## 491                M 0.645564268  0.555680103    0.697148575 0.6538526900
## 492                M 0.069522306  1.490338687    0.032923191 0.0656410132
## 493                M 0.722180686  0.576605295    0.691387016 0.7493305273
## 494                B 0.262482175  0.344103160    0.222231541 0.3068930487
## 495                B 0.895277039  0.000000000    0.753118000 1.0627592614
## 496                B 0.418552657  0.578930317    0.432116885 0.4242512239
## 497                B 0.100736402  0.167401537    0.131692765 0.0900787930
## 498                M 0.602999591  0.495229548    0.506194066 0.6734597459
## 499                M 0.807310040  0.000000000    0.821022082 0.8064467336
## 500                M 0.339098593  0.832357644    0.296308721 0.3546319674
## 501                M 1.255657971  0.109276004    1.362197038 1.5884556875
## 502                M 1.054185167  0.818407516    1.076176814 0.9925716845
## 503                M 0.120599918  1.527539029    0.127577366 0.1409434742
## 504                B 0.520707882  1.195060975    0.493847869 0.5853700745
## 505                B 0.554759623  0.302252776    0.576155847 0.5791185494
## 506                B 0.668265429  0.051150470    0.646117628 0.7444998034
## 507                B 0.551921978  1.164835698    0.563809650 0.6535685297
## 508                B 0.940679362  0.955583776    0.847772175 1.1451657282
## 509                M 0.883926459  0.074400683    0.806618186 1.0258184314
## 510                M 0.696641880  1.113685228    0.640356070 0.7089797746
## 511                B 0.600161946  0.613805637    0.572040448 0.6677765412
## 512                M 0.815822976  1.248536466    0.802502787 0.8581638956
## 513                M 1.567798936  1.134610420    1.449031955 1.4208011516
## 514                B 0.631376042  0.130201196    0.697148575 0.6228792249
## 515                M 1.318086164  0.553355082    1.296762195 1.2304137973
## 516                M 0.568947849  0.974183947    0.452693880 0.6214584237
## 517                M 1.054185167  0.750981897    1.088111471 1.0212718678
## 518                M 0.279508046  0.204601879    0.271616328 0.3409922764
## 519                M 0.330585658  0.916058413    0.292193322 0.3864579132
## 520                B 0.421390302  0.344103160    0.275731727 0.4830723915
## 521                B 0.642726623  0.378978481    0.572040448 0.6433387614
## 522                B 0.038308209  4.143188051    0.032923191 0.0323942663
## 523                M 0.069522306  1.322937150    0.123461967 0.0031257625
## 524                B 1.414566099  1.255511530    1.360139339 1.2917924070
## 525                B 0.631376042  0.406878737    0.604963639 0.6876677574
## 526                B 0.966218168  2.245970627    0.884810765 1.3838603216
## 527                B 2.864602762  1.118335271    2.991895005 4.4584740137
## 528                M 0.424227947  0.118576089    0.390962896 0.5058052100
## 529                B 0.052496435  1.176460804    0.074077180 0.0548429245
## 530                B 0.200053982  1.071834844    0.135808164 0.1648129336
## 531                B 0.625700752  2.559848509    0.567925049 0.8269062702
## 532                B 0.253969239  0.602180530    0.185192951 0.2699522188
## 533                B 1.071211038  0.218552007    0.983580339 1.2844042410
## 534                M 0.994594619  0.704481470    0.900037741 0.9550625341
## 535                M 0.824335911  0.392928609    0.811556664 0.8226438668
## 536                B 0.370312690  0.848632794    0.436232284 0.4432899593
## 537                B 0.446929108  0.520804783    0.292193322 0.4927338394
## 538                B 1.403215518  0.416178822    1.588543978 1.6396045289
## 539                B 1.772109386  0.611480616    1.683198153 1.6208499537
## 540                B 0.194378692  0.209251922    0.172846754 0.2131201727
## 541                M 0.929328781  1.829791805    1.065888317 0.9462535670
## 542                B 0.529220817  2.225045435    0.481501672 0.5543966093
## 543                B 1.179041553  0.081375747    1.184411805 1.1380617224
## 544                M 0.631376042  1.699590609    0.798387388 0.7814406334
## 545                M 0.509357301  2.813275837    0.432116885 0.5316637909
## 546                B 0.180190466  0.292952690    0.292193322 0.2114152114
## 547                B 0.370312690  0.413853801    0.473270874 0.3813430291
## 548                B 0.339098593  0.181351666    0.251039333 0.3785014268
```

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## 549                B 1.020133425  0.843982751    1.185234885 1.1792649558
## 550                B 0.517870237  0.088350811    0.465040076 0.3662825369
## 551                B 0.171677531  0.702156449    0.041153989 0.1901031941
## 552                B 1.556448355  0.641705893    1.492655183 1.3963633718
## 553                M 0.276670400  0.425478908    0.214000743 0.2602907710
## 554                B 1.275521487  0.202276858    1.190996444 1.2184790676
## 555                B 0.920815846  0.857932879    0.769579596 1.1195913074
## 556                M 0.671103074  0.048825448    0.650233027 0.7700742242
## 557                B 0.253969239  0.641705893    0.251039333 0.2870018326
## 558                B 0.622863107  1.941392830    0.719783269 0.6038404894
## 559                B 0.177352821  0.337128096    0.000000000 0.1420801152
## 560                B 0.245456304  0.313877883    0.201654546 0.2816027882
## 561                M 0.699479525  0.850957815    0.666694623 0.7388165988
## 562                B 0.089385822  0.279002562    0.185192951 0.0787123838
## 563                B 0.855550008  0.011625107    0.893041563 0.9434119647
## 564                B 0.810147685  0.583580360    1.214042677 0.8894215209
## 565                B 1.380514357  0.599855509    1.244085089 1.2960548105
## 566                B 1.215930939  0.190651751    1.242850470 1.3497610940
## 567                M 0.872575878  0.060450555    0.846537555 0.8496390886
## 568                B 0.580298430  0.220877029    0.628832953 0.6291307499
## 569                M 1.147827456  1.478713580    1.115273104 1.2900874456
##     smoothness_mean compactness_mean concavity_mean  points_mean
## 1       0.856078662     0.1037628068   0.0348721359 0.3494589134
## 2       0.435149619     0.7462212076   0.3359265462 0.0767984928
## 3       1.204482769     0.0520707516   0.0831662808 0.0350489766
## 4       1.823077815     0.7253929069   0.1161568266 0.6319124304
## 5       0.791375042     0.1126621717   0.0396388307 0.0806641887
## 6       0.376845258     0.0365442002   0.2227802636 0.2360651657
## 7       0.131540326     0.5076424911   0.9296309311 0.4538327039
## 8       0.649169284     0.1986262489   0.0895636871 0.2945660310
## 9       0.891630102     0.2968979583   0.2117416019 0.2569399238
## 10      0.300054149     0.1609459595   0.0220773234 0.0033502698
## 11      0.285122544     0.6363992587   0.8957623100 0.3004934314
## 12      0.722405250     0.7081622219   0.4565741011 0.4966903862
## 13      0.428750360     1.0927283910   0.8255162809 0.3587365836
## 14      0.274457113     0.3660100468   0.4297551707 0.9249321829
## 15      0.856078662     0.0255620053   0.0647266982 0.0610779959
## 16      1.126269602     0.3749094116   0.1071251943 0.1386496279
## 17      0.496298095     0.2628152845   0.0125439338 0.2306531913
## 18      2.335018544     1.5130813676   0.1011041061 0.5636184687
## 19      0.685431753     0.0130650249   0.1549175820 0.1515352810
## 20      1.723533785     1.9959192462   0.9622451589 1.5952438597
## 21      1.524445724     1.0416043803   0.3470906472 0.1865842576
## 22      0.813416935     0.1204254474   0.0332414245 0.1123628954
## 23      0.423062130     0.3217025708   0.5911955982 0.0134010793
## 24      0.809861791     0.3470752280   0.1916713079 0.2244680778
## 25      0.514784843     0.7183870240   0.4080667092 0.3765445563
## 26      0.278012257     0.1899162322   0.0624687901 0.0796333365
## 27      0.537537765     0.2630046327   0.5661077307 0.5167146912
## 28      0.574511262     0.0035976156   0.0677372423 0.0327295590
## 29      1.737754361     1.0283500072   0.0001254393 0.1698329085
## 30      0.274457113     0.4612521851   0.0036377408 0.0633974135
## 31      1.598392718     0.4184594947   0.1862774164 0.2590016283
## 32      0.657701630     0.6996415534   0.2935280500 0.2510125233
## 33      1.076497587     0.7462212076   0.6110150136 0.7826745722
## 34      0.444392993     0.4943881180   0.3914961727 0.1945733625
## 35      0.501275296     0.6496536319   0.3507283880 0.3700759584
## 36      0.007821317     0.2455845994   0.1073760730 0.1819454224
## 37      0.606507557     0.5417251649   0.9183413908 0.5319197619
## 38      1.211593057     1.4808921757   1.0011313536 1.1965617513
## 39      0.694675127     0.4036903361   0.3784504816 0.0760253536
## 40      0.135806499     0.5366127638   0.4452218410 0.5421251992
## 41      0.742314056     0.4962815999   0.2083547398 0.1231868441
## 42      0.448659166     0.4799976557   0.0194430973 0.0288638631
## 43      1.036679975     0.7600436253   0.2837437817 0.1203520004
## 44      0.312852667     0.0301063618   0.0965882900 0.3522937571
## 45      0.770755207     0.3643059131   0.0615907148 0.0481923428
## 46      0.706762616     0.0384376821   0.1502763265 0.1466387328
## 47      0.634237680     2.3083437558   2.0121724149 0.6607762934
## 48      0.880253641     0.2484248222   0.0923233525 0.4726457575
## 49      1.159687955     0.0579405454   0.1807580855 0.1100434779
## 50      0.216152752     0.3627911276   0.2892631126 0.3610560012
## 51      0.666233975     0.5354766747   0.0000000000 0.0293792892
```

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## 52      0.200510119     0.0793368906   0.0430256928 0.0525734648
## 53      0.553891427     0.0674079548   0.1388613468 0.3703336715
## 54      0.708184674     0.0522600998   0.0169343106 0.1778220134
## 55      0.351248222     0.2188865049   0.0457853582 0.0206170450
## 56      1.595548603     1.1097697279   0.7848739355 1.2164056571
## 57      2.342128831     0.6780558600   0.5257162640 0.8262280798
## 58      1.508092062     0.7195231131   0.1817616002 0.3022974228
## 59      0.051905102     0.2313834853   0.0942049426 0.0780870581
## 60      0.120163865     0.0195028633   0.1116410105 0.2370960179
## 61      0.597264183     0.6004231031   0.2102363299 0.3708490976
## 62      0.239616702     0.7110024447   0.3499381202 0.2613210458
## 63      0.105232261     0.0191241670   0.0125439338 0.0064428266
## 64      0.502697354     0.4650391489   0.3139746621 0.1499890026
## 65      1.226524661     0.0700588294   0.0436528895 0.1188057220
## 66      0.500564268     0.3573000301   0.1280735637 0.0164936360
## 67      1.090718163     0.1842357866   0.2434777543 0.1105589040
## 68      1.240034208     1.0150956341   0.5944570210 0.1347839319
## 69      1.511647206     0.9817703530   0.4652545033 0.6040794196
## 70      0.538959822     0.0149585068   0.0556950659 0.1059200689
## 71      1.323224577     0.5689913039   0.0786504647 0.3193064850
## 72      0.984063844     0.1323543832   0.2005775009 0.0966423986
## 73      0.224685097     0.5398316830   0.8267706743 0.5275386399
## 74      1.339578239     0.7556886170   0.5602120818 0.0458729252
## 75      0.628549450     0.1755257700   0.2710744086 0.3937855602
## 76      0.784975783     0.2936790391   0.3529235764 0.3267801638
## 77      1.666651482     0.5000685636   0.4216016138 0.2940506048
## 78      0.233928472     1.0453913441   1.1917991468 0.0453574991
## 79      0.312141638     0.4852994050   0.2574015208 0.3167293544
## 80      1.240034208     1.0434978622   0.7393394560 0.8398868722
## 81      0.206909378     0.2637620254   0.2871306438 0.3100288147
## 82      1.139068120     0.3485900135   0.2176372508 0.2657021679
## 83      0.000000000     0.3110990723   0.1407429368 0.0056696874
## 84      0.158559420     0.0312424510   0.0457853582 0.2169943990
## 85      0.013509547     0.7462212076   0.7461131802 0.6360358394
## 86      0.287966660     0.1234550184   0.0905672018 0.2399308616
## 87      2.036386452     0.6023165850   0.0444055255 0.4958399331
## 88      0.934291829     0.0191241670   0.4652545033 0.6040794196
## 89      0.167091765     0.4332286534   0.2178881295 0.0981886770
## 90      0.579488463     0.5260092653   0.2178881295 0.2564244976
## 91      0.706762616     0.3724478851   0.1700957418 0.2038510328
## 92      0.433727561     0.1777979482   0.2700708939 0.6419632398
## 93      1.080052731     0.7715938647   0.2969149122 0.1662249256
## 94      0.425906245     0.1351946060   0.1337183339 0.1090126256
## 95      0.401731266     0.6996415534   0.4091454875 0.4385503192
## 96      1.190262193     0.1522359429   0.3531869990 0.0971578247
## 97      0.283700487     0.3749094116   0.1486456151 0.1917385188
## 98      0.254548307     0.4799976557   0.3383098936 0.4624660915
## 99      0.226818184     1.7478731203   1.2432292752 1.0973422221
## 100     0.720983192     0.2978446992   0.1253138983 0.2417348531
## 101     0.802040474     0.6583636485   0.2147521460 0.2850306476
## 102     0.664100889     0.5807308916   0.2152539034 0.3177602066
## 103     0.230373328     0.0319998437   0.1307077898 0.2680215855
## 104     1.223680546     0.4684474163   0.0561968233 0.0783447711
## 105     0.750846401     0.8105995914   0.6980699139 0.8360211762
## 106     0.236772587     0.3857022583   0.2768446181 0.0659745441
## 107     1.472540622     0.8355935522   0.4190802831 0.5146014441
## 108     0.590153895     0.0179880778   0.2527602653 0.5821738092
## 109     0.218996867     0.1834783938   0.7004532613 0.2935351787
## 110     0.804884589     0.2183184604   0.1038637716 0.2615787589
## 111     0.796352244     0.1382241770   0.0455344796 0.0520580387
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## 113     0.949223433     0.5227903461   0.1250630196 0.4173405341
## 114     0.755823603     0.6610145231   0.1663325617 0.1479272981
## 115     0.362624682     0.1056562887   0.0599600034 0.4543481300
## 116     0.086745512     0.2476674295   0.3319124874 0.1100434779
## 117     1.040946147     0.1420111407   0.4024595708 0.4086556039
## 118     0.396754064     0.5316897110   0.3102114819 0.2512702364
## 119     0.027730123     0.5377488530   0.3268949139 0.2414771400
## 120     0.145049873     0.4330393052   0.1383595894 0.1412267585
## 121     0.695386156     0.1931351514   0.2295539879 0.2260143562
## 122     0.072524936     0.2039279981   0.0761416779 0.1579781076
## 123     1.190262193     0.7291798707   0.0617161541 0.2082321549
## 124     0.688275868     0.0556683672   0.3926251268 0.0489654820
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## 124     0.688275868   0.0556665672   0.5926251266 0.0489654820
## 125     0.195532917   0.3381758632   0.0119167371 0.2422502792
## 126     0.398887151   0.5152164186   0.3951339135 0.3948164124
## 127     0.609351672   0.8636170839   0.8706744425 0.9476109325
## 128     1.723533785   0.0469583505   0.0372554833 0.2334880350
## 129     0.403864352   0.3169688661   0.0429002535 0.1461233067
## 130     1.208748942   0.7412981547   0.4306583339 0.4901960170
## 131     0.894474217   0.3883531329   0.9333941113 0.2695678639
## 132     0.506963527   0.1980582043   0.1716010139 0.1340107927
## 133     0.706762616   0.5985296212   0.1763677087 0.1992121977
## 134     1.609769179   0.1007332358   0.3292782613 0.2716295684
## 135     1.545776588   0.6894167513   0.0214501267 0.1677712040
## 136     0.103099174   0.6723754144   0.1698448631 0.1840071269
## 137     0.420218014   0.1635968341   0.3036886364 0.1082394864
## 138     0.206909378   0.3285191056   0.1692176665 0.0149473577
## 139     1.382239966   0.3470752280   0.1106374958 0.0286061500
## 140     0.201932176   0.6110266016   0.4652545033 0.6040794196
## 141     1.183151905   0.3184836516   0.4652545033 0.6040794196
## 142     2.470114013   2.7476315512   1.0249648277 1.2097051175
## 143     0.547492168   0.5814882843   0.4530404750 0.5282860078
## 144     0.199799090   0.1978688561   0.4328911541 0.0842721716
## 145     0.280145343   0.5600919391   0.2007029402 0.0747367883
## 146     0.880964670   2.8025425256   3.3016888057 1.4055670454
## 147     0.568823031   0.6239022783   0.2147521460 0.2177675382
## 148     1.567107451   0.3283297574   0.0715004224 0.2030778936
## 149     0.912960965   0.0195028633   0.1435026022 0.2149326945
## 150     0.413107726   0.0558577154   0.1668343190 0.1878728229
## 151     1.154710754   0.2950044764   0.1407429368 0.1870996837
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## 153     0.787108870   0.2794779250   0.0032614228 0.4719241609
## 154     0.415951842   0.4731811210   0.1721027712 0.3562883095
## 155     0.681876609   0.6848723948   0.4342709869 0.4711252504
## 156     0.169935881   0.9033802033   0.8004284134 0.3984243953
## 157     0.338449704   0.3003062256   0.2660568351 0.4515906002
## 158     0.454347396   0.2043066945   0.0434020108 0.1028275121
## 159     0.573800233   1.1571067748   0.5032626226 0.9787942131
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## 161     2.420341998   0.4214890657   0.8016828068 1.1006924919
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## 166     0.499853239   0.1136089126   0.3706732427 0.6280467344
## 167     0.863188950   0.4220571103   0.1347218486 0.2530742278
## 168     0.032707324   0.0244259162   0.2872560832 0.1015389468
## 169     0.771466236   0.4171340574   0.0895636871 0.0706133792
## 170     0.726671422   0.3071227604   0.2590322322 0.3280687291
## 171     0.502697354   1.4733182482   0.6142764364 0.1360724972
## 172     0.628549450   0.4409919291   0.2502514786 0.2791032472
## 173     0.733781710   0.2586496243   0.4617422018 0.4481630165
## 174     0.733070682   0.4105068709   0.1289516391 0.2337457481
## 175     0.068258764   0.1325437314   0.0422730568 0.0185553405
## 176     0.363335711   0.1545081211   0.3907435367 0.6718579551
## 177     1.169642358   0.6252277157   0.4652545033 0.6040794196
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## 179     0.401731266   0.5900089528   0.4016943909 0.4581107407
## 180     0.490609865   0.3285191056   0.3710495607 0.3853325717
## 181     0.246726990   0.1702240207   0.1249375803 0.3574480183
## 182     0.309297523   0.1573483439   0.1860265377 0.1151977391
## 183     1.197372481   1.1003023185   0.5403926665 0.7035566619
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## 185     0.550336283   0.2186971568   0.1446315563 0.0806641887
## 186     0.110209462   0.0670292584   0.0856750676 0.0816950410
## 187     1.368019390   0.2802353177   0.0090316323 0.1170017306
## 188     1.777571973   0.4372049653   0.1547921426 0.2499816711
## 189     1.109915940   0.7216059432   0.4264937479 0.4342980537
## 190     0.570956118   0.2474780813   0.0518064464 0.0118548009
## 191     0.666945004   0.7840908451   0.6699715023 0.3138945107
## 192     1.019615284   0.8314278920   0.5206986905 0.5430014236
## 193     0.621439162   0.0810410243   0.1052436043 0.2102938594
## 194     2.256805377   0.0604020719   0.2784753295 1.3040280985
## 195     1.108493882   0.5307429700   0.3058211051 0.3162139282
## 196     0.348404107   0.1259165448   0.1398648615 0.0224210365
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## 197     0.142916787     0.0475263951   0.1127699645 0.3051322665
## 198     0.311430610     1.4354486107   1.4715288697 0.6447980835
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## 200     0.817683108     0.7831441042   0.3331668807 0.3185333458
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## 205     0.368312913     0.3395013005   0.1477675397 0.1664826387
## 206     0.954200635     0.8174161261   0.3243861271 0.4739085515
## 207     0.635659737     0.2459632958   0.2738340740 0.2095207202
## 208     1.166087214     0.9238298076   0.4502770463 0.4636515716
## 209     1.126269602     1.2498873868   3.4609967644 0.5234152309
## 210     0.962732980     1.0340304528   1.0287280079 0.9965764144
## 211     0.297921063     0.1840464384   0.2246618537 0.5628453295
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## 213     0.920071253     0.1656796642   0.0783995860 0.1458655936
## 214     0.556735542     0.0319998437   0.1269446097 0.0095353833
## 215     1.311137087     0.3705544033   0.2104872085 0.1244754094
## 216     0.870299238     0.3198090890   0.2172609328 0.4973862115
## 217     0.789241956     0.3688502696   0.2034626056 0.0793756234
## 218     0.677610436     0.3228386600   0.3118421933 0.0002577131
## 219     0.225396126     0.1806381710   0.1786256168 0.1146823130
## 220     0.969843268     0.0462009578   0.1928002619 0.2164789729
## 221     1.289806223     0.0562364117   0.2449830264 0.1010235207
## 222     0.145760902     0.1191000100   0.1304569111 0.2450851229
## 223     0.116608721     0.3643059131   0.0360010899 0.2736912729
## 224     0.979086643     0.7821973632   0.4652545033 0.6040794196
## 225     0.654146486     0.0024615264   0.2240346570 0.0969001117
## 226     0.976953556     0.0893723446   0.1529105526 0.1538546986
## 227     0.645614141     0.6950971969   0.3798303143 0.0644282657
## 228     0.776443438     0.5496777888   0.2719524840 0.3352846949
## 229     0.340582790     0.2953831728   0.2937789287 0.3745343944
## 230     1.780416088     0.6288253312   0.2783498902 0.2409617139
## 231     0.963444009     0.2313834853   0.2858762504 0.0422649423
## 232     0.542514966     0.6299614204   0.3679637530 0.3841213203
## 233     0.007821317     0.0585085900   0.0994733947 0.2105515724
## 234     0.350537193     0.3974418459   0.0932014279 0.0185553405
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## 237     0.955622693     1.0302434891   0.2738340740 0.1381342017
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## 240     0.278723285     0.2270284770   0.2969149122 0.0131433662
## 241     0.763644920     0.1386028734   0.1522833559 0.1208674265
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## 243     0.141494729     0.1016799768   0.0814101301 0.0242250279
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## 245     0.249571105     0.1546974693   0.2279232765 0.5718652867
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## 247     0.989041046     0.2783418359   0.2323136533 0.1600398121
## 248     0.142916787     0.0518814034   0.2454847837 0.1195788612
## 249     1.457609018     0.5108614103   0.2087310578 0.3848429169
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## 253     1.394327455     0.0386270303   0.5498006168 0.1175171567
## 254     0.563134801     0.8901258302   0.8016828068 0.1260216878
## 255     0.571667146     1.2972244337   0.3690425313 0.7867979812
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## 257     0.435149619     0.6517364619   0.2580287175 0.1744717436
## 258     0.224685097     1.1230241010   1.2582819957 0.4216185710
## 259     1.559286135     0.7036178654   0.2604120649 0.5235440874
## 260     0.912249936     0.4525421685   0.1828905543 0.4011303825
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## 262     0.898029361     0.6038313705   0.1836431903 0.1079817734
## 263     0.400309208     0.1211828401   0.0258405036 0.1368456364
## 264     0.479944433     0.7310733526   0.5391382731 0.4842428453
## 265     1.168931329     1.6020750158   4.6877934864 1.4207721161
## 266     0.482077519     0.4574652214   0.2166337361 0.1438038891
## 267     5.164913124     2.8139034169   0.7552702518 0.7494295871
## 268     0.012087489     0.1185319655   0.3100860426 0.0043811221
## 269     1.780416088     0.8579366383   0.3183650389 0.1435461761
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## 270     0.108076376     0.0861534254   0.0455344796 0.1373610626
## 271     0.678321465     0.0047337047   0.4022212361 0.3164716413
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## 275     0.807017676     0.4095601299   0.0205720514 0.0085045311
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## 280     1.161821041     0.7613690626   0.2605375042 0.7530375700
## 281     0.827637511     0.1963540706   0.0944558212 0.0690671009
## 282     0.734492739     0.1367093915   0.1239340656 0.0000000000
## 283     0.990463103     0.6886593585   0.4458615817 0.4599662748
## 284     0.204065262     0.7594755807   0.3671609412 0.2056550242
## 285     1.033835859     0.0365442002   0.3819251513 0.2907003350
## 286     1.751263908     0.5890622118   0.6357265631 0.0108239486
## 287     0.495587066     0.1119047789   0.1447569956 0.0425226554
## 288     0.635659737     0.5076424911   0.5993491552 0.8215892447
## 289     2.726084378     0.5568730199   0.3973918216 1.0854874212
## 290     0.044083785     0.6159496545   0.4652545033 0.6040794196
## 291     2.008656329     1.0586457172   0.4452469289 0.5563509603
## 292     0.774310351     0.0852066844   0.0204466120 0.0695825270
## 293     0.184156456     0.1535613802   0.3329160021 0.3479899489
## 294     1.040946147     1.0662196447   0.5057714093 0.1172594436
## 295     0.401731266     0.4313351715   0.4469278160 0.5200391897
## 296     1.090718163     0.6780558600   0.3784504816 0.4177528750
## 297     0.439415792     0.3093949386   0.0219518841 0.1546278378
## 298     0.232506414     0.1757151182   0.0748872846 0.1340107927
## 299     0.465723857     0.4122110045   0.2210241129 0.1043737905
## 300     0.066125677     0.7125172302   0.1438789203 0.1492158635
## 301     0.230373328     0.2895133789   0.1683395911 0.0085045311
## 302     1.522312638     0.6061035487   0.5311101555 0.1633900819
## 303     0.059726418     0.4343647425   0.2798551622 0.6378398308
## 304     1.375129678     0.6553340775   0.6438801200 0.8849866582
## 305     0.442970936     1.0245630434   1.1742376395 0.3535823224
## 306     1.077208616     0.7382685837   0.3610645894 0.3046168404
## 307     0.092433743     0.2406615465   0.0954593359 0.2139018423
## 308     1.237901122     0.4267908150   0.2394636955 0.2803918125
## 309     0.434438590     0.4209210212   0.1949327307 0.1144246000
## 310     2.384790559     0.2715253011   0.0889364904 0.3654628946
## 311     2.207033361     1.7194708922   0.1399903008 0.7625729533
## 312     0.692542041     0.4105068709   0.3066991805 0.1765334481
## 313     0.002133086     1.7175774103   2.3947623946 0.9269938874
## 314     1.901290982     1.3824311181   0.8142267405 0.8298360627
## 315     0.921493311     0.7488720822   0.4029487843 0.4382668349
## 316     1.882093205     0.9190961029   0.3743109835 0.4430087552
## 317     0.429461389     0.4758319956   0.0367537259 0.0507694734
## 318     1.190262193     0.9791194784   0.1077523910 0.1974082062
## 319     0.405286410     0.2238095578   0.0224536414 0.0564391608
## 320     0.671211177     1.3824311181   0.6266949308 0.7107726276
## 321     0.526161304     0.4924946361   0.3294037006 0.0324718459
## 322     0.632104594     0.5777013206   0.5388873944 0.3806421940
## 323     2.711152773     0.5996657103   0.4652545033 0.6040794196
## 324     1.865739543     0.0073845793   0.4652545033 0.6040794196
## 325     0.248149047     0.2480461258   0.0239589135 0.1878728229
## 326     0.834036770     0.0000000000   0.2168846148 0.0793756234
## 327     0.258103450     0.4773467811   0.1643255323 0.0440689338
## 328     0.543937024     0.3978205423   0.2797297229 0.4554047535
## 329     0.334894560     0.4887076724   0.3593837023 0.3729108021
## 330     0.290099746     0.8446822652   0.6953102485 0.2525588017
## 331     0.839013971     0.5693700003   0.2893885519 0.1311759490
## 332     0.025597036     0.1401176589   0.2666840318 0.1891613882
## 333     0.318540898     0.3892998738   0.0844206742 0.0170090622
## 334     0.186289543     0.4309564751   0.2666840318 0.3082248233
## 335     0.356936452     0.5019620455   0.0026342261 0.0064428266
## 336     0.066125677     0.0007573928   0.0610889574 0.2592593413
## 337     3.294907409     0.8939127940   0.0472906303 0.0198439058
## 338     0.485632663     0.6273105457   0.4419227865 0.5287241200
## 339     0.692542041     0.0783901497   0.3068246198 0.2644136026
## 340     0.274457113     0.9279954677   0.6966900812 0.0092776703
## 341     0.426617273     0.0800942834   0.1280735637 0.1450924544
## 342     0.606507557     0.7064580882   0.0944558212 0.5051176034
```

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## 342     0.606507557     0.7064560882   0.0944558212 0.5051176054
## 343     0.877409526     0.2959512173   0.3616416104 0.1043737905
## 344     1.084318903     0.1490170237   0.3031868790 0.1229291310
## 345     1.281273878     0.2773950949   0.0998497128 0.2249835040
## 346     1.176041617     0.4135364419   0.1973160781 0.5401665800
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## 348     0.191266744     0.2912175126   0.1343455306 0.0708710923
## 349     0.877409526     2.0508302206   1.3536158923 1.0195128770
## 350     0.699652329     0.3381758632   0.1688413484 0.0615934220
## 351     0.073235965     0.2577028834   0.0451581615 0.0216478973
## 352     0.286544602     0.1863186167   0.2151284640 0.1680289170
## 353     1.479650910     0.4366369208   0.0292273657 0.1564318292
## 354     1.609769179     0.2470993849   0.0114149797 0.2721449945
## 355     1.144756351     0.2906494681   0.1442552383 0.1355570711
## 356     0.573089204     0.3086375459   0.0160562352 0.0791179103
## 357     1.360909102     0.3243534455   0.3996497297 1.0697669243
## 358     2.140196655     0.8416526942   0.0558205052 0.1412267585
## 359     0.447948137     0.6068609415   0.8460883323 0.6654151285
## 360     0.071102879     0.6369673033   0.1774966627 0.1121051824
## 361     0.412396698     0.9741964255   0.9652557030 1.0751788986
## 362     0.106654318     0.0823664616   0.9214773742 0.9172007911
## 363     0.426617273     0.7072154809   0.2126196773 0.0316987067
## 364     0.828348539     1.4151883546   1.3075796554 1.5266921849
## 365     0.661967803     1.2885144170   0.7808598767 0.3587365836
## 366     0.861055864     0.5576304127   0.5437795286 0.1744717436
## 367     0.963444009     0.7674282046   0.8420742735 0.5288272052
## 368     0.312852667     0.9060310780   0.5450339220 0.1092703387
## 369     0.156426334     0.4459149819   0.0068991636 0.1816877094
## 370     0.696808213     0.6485175427   1.2474942127 1.0906416824
## 371     2.865446020     2.8695717840   1.1295812353 0.4875931151
## 372     2.025721020     0.8696762259   0.5149284810 0.7344822294
## 373     0.903006562     1.9682744108   2.3262725163 2.7065025871
## 374     0.028441152     0.3663887431   0.6565494931 0.7798397285
## 375     0.846124259     1.4399929672   2.5207034896 1.9514033127
## 376     3.021872354     2.9225892766   3.4552265549 2.9616385195
## 377     0.106654318     0.2243776024   0.1411192548 0.2154481206
## 378     0.809861791     1.6407020461   0.7444824688 0.3435315129
## 379     0.191977773     0.5292281845   0.8097109244 0.4643989394
## 380     0.113764606     0.3360930331   0.2113652839 0.5234152309
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## 386     0.563134801     0.5708847858   0.5224548412 0.0010308523
## 387     1.692248518     1.4426438418   1.3705502029 1.4898392169
## 388     0.376845258     2.0629485046   0.5864289034 0.5180032565
## 389     0.518339987     0.0899403891   0.3882347500 0.4089906309
## 390     0.291521804     2.5401059375   2.2898951084 2.5312577043
## 391     0.250993163     1.1427163125   0.9709004732 0.8682353091
## 392     0.227529213     0.4231931994   0.0708732258 0.0095353833
## 393     0.775021380     1.8357306794   0.7708247297 0.1554009770
## 394     1.343133383     0.4061518625   0.3882347500 0.7453061781
## 395     0.247438019     0.2224841205   0.4183401910 0.6824241907
## 396     0.981219729     0.4515954276   0.4735334995 0.1249908355
## 397     0.595131097     0.0331359328   0.3029360004 0.0162359230
## 398     0.803462532     0.0463903060   0.1586807621 0.2404462877
## 399     0.594420068     0.8848240809   0.4333929115 0.0420072293
## 400     2.673468247     0.8359722485   0.6993243073 0.2507548103
## 401     1.093562278     1.2495086904   0.8460883323 0.8651427523
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## 404     0.194110859     1.7069739118   1.5297327224 0.2791032472
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## 406     0.703918501     0.2527798305   0.0144255238 0.1396804801
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## 409     1.151866638     2.7502824258   1.8659101472 1.5674108489
## 410     0.312852667     0.5481630033   0.0921979132 0.2997202922
## 411     0.191977773     1.2960883446   0.7796054833 0.0064428266
## 412     0.227529213     1.0310008818   0.1110138138 0.0399455248
## 413     0.362624682     0.0596446791   0.6499012082 0.5210958133
## 414     1.457609018     0.1997623380   0.5889376902 0.7625729533
```

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## 415     0.624283277     0.0918338710   0.2038389236 0.3613137143
## 416     0.511940728     1.1181010481   1.7028390083 2.6163030151
## 417     0.868166152     0.0956208348   0.6821391180 0.2888963436
## 418     0.966999153     0.1751470736   0.3606380957 0.3319344251
## 419     0.270190940     0.3607082975   0.4860774333 0.5579487813
## 420     1.187418078     0.6087544233   0.7236595388 0.6811356254
## 421     0.833325741     1.3154018597   1.1637007352 1.3375307967
## 422     0.220418925     0.1069817260   0.2389619382 0.0943229810
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## 424     0.748002286     0.9109541308   0.6731074857 0.5128489953
## 425     0.955622693     0.6905528404   0.9514573759 1.1723367234
## 426     0.846124259     0.4705302463   0.4973669737 0.5855240790
## 427     0.561712743     0.6676417097   0.4522088121 0.4589869651
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## 429     0.354803366     0.3531343700   0.7134989524 0.6919595740
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## 431     0.442970936     0.8399485605   1.0715028220 0.8862752235
## 432     1.372285563     0.8852027773   0.5312355948 1.5622565876
## 433     0.014220576     0.6562808184   0.3493485553 0.5347546056
## 434     0.592286981     1.5344777128   1.5977208433 1.4764381377
## 435     1.144756351     1.0347878456   0.6478941788 0.0278330108
## 436     0.179179255     1.3862180819   1.5617197534 1.3176868909
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## 438     0.817683108     0.0785794979   0.2765937395 0.1301450968
## 439     0.348404107     0.9590485705   0.2239092177 0.1762757351
## 440     1.820233700     0.7128959266   0.0809083728 0.1389073409
## 441     1.266342273     0.3379865150   0.2377075448 0.2767838296
## 442     0.910116850     0.6030739777   0.8573778727 0.5133644214
## 443     0.789241956     0.3133712506   0.7770966966 1.0210591554
## 444     0.890208044     0.2376319755   0.5989728372 0.2937928918
## 445     1.045212320     0.0085206684   0.0445309649 0.0360798288
## 446     0.156426334     1.2430708520   0.2301811845 0.0644282657
## 447     0.526161304     0.0842599435   0.6705986989 0.8715855789
## 448     1.107782853     1.3150231633   1.5358792499 1.4924163476
## 449     0.284411516     0.9950247262   1.1333444155 0.2865769260
## 450     0.618595047     3.3902793001   2.0854289880 1.3251605697
## 451     1.478939881     2.3715860505   2.1017361019 0.8638541870
## 452     0.497720152     0.1902949286   0.0595836854 0.1394227671
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## 456     0.341293819     2.1481551890   0.6917979470 0.6576837367
## 457     1.206615855     0.1978688561   0.5011301538 0.4783154448
## 458     0.853234547     0.3644952613   2.1167888224 1.8869750470
## 459     1.254965813     0.5689913039   0.7380850626 0.8571536474
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## 462     0.538248793     0.0331359328   0.4998757604 0.5582064944
## 463     0.106654318     0.0255620053   0.1285753211 0.2069435896
## 464     0.106654318     0.5349086301   1.5033904614 1.1524928175
## 465     1.265631245     0.1069817260   0.1611895488 0.5417128583
## 466     0.291521804     1.1938403232   1.1722306101 1.6447247678
## 467     0.056882303     1.4816495685   0.9991243242 1.5674108489
## 468     0.170646909     0.7867417197   0.7168858145 1.1834183851
## 469     0.276590199     0.5614173764   0.0432765715 0.2242103648
## 470     0.028441152     1.0783379287   0.9062992143 0.1458655936
## 471     1.085029932     0.2622472399   0.4020330771 0.2677638724
## 472     0.597264183     0.2755016130   0.0859259463 0.1175171567
## 473     0.021330864     0.2262710843   0.4597351724 0.5582064944
## 474     0.754401545     0.4724237282   0.0508029317 0.0742213621
## 475     0.184867485     1.4456734128   1.3001787345 0.2064281634
## 476     0.756534632     0.0198815597   0.0119167371 0.3922392818
## 477     0.099544030     0.5349086301   0.3104623606 0.0708710923
## 478     0.135095470     0.2130167111   0.6633232174 0.6365512655
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## 480     0.505541469     0.6788132528   0.5475427087 0.9643622816
## 481     0.433727561     0.0236685235   0.2076021038 0.6726310943
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## 483     0.246015961     0.5121868476   0.2239092177 0.0430380815
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## 485     0.334183531     0.0766860160   0.9966155374 1.4102058805
## 486     1.030991744     0.0350294147   0.0319870311 0.0010308523
## 487     0.784975783     0.1486383273   0.5688673961 0.6540757538
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## 489     1.016771168     0.0766860160   0.3581293089 0.1667403517
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## 494     0.538248793     0.4421280182   0.4848230399 0.3164716413
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## 497     0.661256774     0.6466240609   0.4283753380 0.4927473764
## 498     0.092433743     0.2565667943   0.1687159091 0.0095353833
## 499     0.551758340     0.6225768410   0.3882347500 0.9509612023
## 500     0.127985182     0.4459149819   0.2000757435 0.2257566431
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## 502     0.520473074     0.8944808385   0.8166100879 1.0666743676
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## 505     0.725249365     0.5443760395   0.4910950068 0.2950814571
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## 507     0.582332578     0.7488720822   0.1800054495 0.2667330202
## 508     0.550336283     0.4686367645   0.0169343106 0.0806641887
## 509     0.760800804     0.3644952613   0.6693443056 0.2172521121
## 510     0.995440305     0.6163283508   0.2214004309 0.0760253536
## 511     0.476389289     0.2357384936   0.9313870819 0.8535456645
## 512     0.223974069     0.6541979884   0.1599351555 1.0365219392
## 513     0.490609865     0.7128959266   0.1825142362 0.3126059454
## 514     0.827637511     1.1652487469   1.2395915344 1.3643329553
## 515     0.711028789     0.1164491354   0.4835686465 0.4522864255
## 516     2.225520110     1.8186893425   1.1722306101 0.9772479347
## 517     0.684009695     1.0173678123   1.2355774756 1.4285035080
## 518     0.327073243     0.1429578817   0.0696188324 0.2120978508
## 519     0.071102879     0.0123076322   0.0282238510 0.1430307499
## 520     0.922204340     1.3918985275   0.8925008872 0.7177308803
## 521     0.120874894     0.4345540907   0.2339443647 0.0481923428
## 522     0.290099746     0.0482837879   0.1210489608 0.0471614905
## 523     0.228951270     0.4042583807   0.6353502451 0.5661955993
## 524     0.085323455     0.0558577154   0.5375075617 1.0478613140
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## 526     0.533982621     0.3417734787   0.1837686296 0.0046388351
## 527     0.440837849     1.2582187070   2.6611955477 2.1292253261
## 528     0.028441152     0.1240230629   0.1009786668 0.0298947153
## 529     1.166087214     1.8035414875   0.8975184607 1.3870117048
## 530     0.905139649     0.1732535917   0.5312355948 0.6118108115
## 531     1.279851820     0.3663887431   0.4622439592 0.5131067083
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## 534     0.995440305     0.6769197709   0.1963125634 0.4816657147
## 535     0.332761473     0.3455604425   0.7208998733 0.7187617326
## 536     0.298632091     1.0669770375   1.0104138646 0.9824021960
## 537     1.571373624     1.9701678926   1.7567779235 0.9772479347
## 538     2.161527519     2.7351345708   3.4502089814 2.4745608305
## 539     1.379395851     1.5725366985   0.2201460375 0.5826892353
## 540     0.149316046     0.0653251247   0.4308841247 0.2231795125
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## 542     1.670917654     0.4383410544   0.6504029656 0.6035639934
## 543     0.359780567     0.5235477389   0.8625208855 0.8700393005
## 544     0.682587638     1.4002298478   0.3393134083 0.7246891330
## 545     0.291521804     0.5973935321   0.2979184269 0.0590162914
## 546     1.936131393     1.1593789531   1.4407962320 1.6290042709
## 547     1.432011981     1.2432602002   1.4847000001 1.3671677990
## 548     1.052322608     1.3225970908   0.2615410190 0.4257419800
## 549     0.547492168     1.7278022124   2.0829202013 1.5751422408
## 550     0.696808213     0.4686367645   0.0106623437 0.0378838203
## 551     0.970554297     1.1754735490   1.1836455898 1.0009575365
## 552     0.618595047     0.3644952613   0.3706732427 0.8880792149
## 553     0.339871761     0.3285191056   0.3731820294 0.0373683941
## 554     0.469279001     0.9003506323   0.2276723978 0.4553789822
## 555     1.241456266     1.0169891159   0.8084565310 0.4151757444
## 556     0.526161304     0.5216542570   0.5776481498 1.0726017680
## 557     0.895896274     0.3057973231   0.3242606878 0.5082101601
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## 559     1.292650339     1.2332247462   0.9836952857 0.7813860069
## 560     0.276590199     0.4402345363   0.3506029487 0.0613357090
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## 560     0.276990199     0.4402345363   0.5306029487 0.0615357090
## 561     0.049772015     0.5027194382   1.2939067676 0.7375747862
## 562     1.029569687     1.1230241010   1.0267209785 0.8344748978
## 563     1.052322608     1.0442552550   1.3189946351 1.6524561597
## 564     1.877116003     4.0340631382   2.8104683595 1.9101692226
## 565     1.166087214     2.0307593127   0.9527117693 0.0219056104
## 566     1.030991744     1.4456734128   1.6263210123 1.8019297362
## 567     0.282278429     0.4269801632   0.2439795117 0.7808705808
## 568     0.826926482     0.5140803295   1.2242879352 1.3826305828
## 569     0.149316046     0.3626017794   0.5249636280 1.0107506329
```

```
#install.packages("car")
library(car)
```

```
## Warning: package 'car' was built under R version 3.5.2
```

```
## Loading required package: carData
```

```
## Warning: package 'carData' was built under R version 3.5.2
```

```
#leveneTest() produces a two-sided test
# Leverne test is used to verify Homoscedasticity. It tests if the variance of two samples are # #equal. Lev
ene's test is an inferential statistic used to assess the equality of variances for a #variable calculated f
or two or more groups.[1] Some common statistical procedures assume that #variances of the populations from
which different samples are drawn are equal. Levene's test #assesses this assumption.
leveneTest(radius_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  90.477 < 2.2e-16 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(texture_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group   1   0.684 0.4086
##       567
```

```
leveneTest(perimeter_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  91.237 < 2.2e-16 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(area_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  170.21 < 2.2e-16 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(smoothness_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group   1  0.8377 0.3604
##       567
```

```
leveneTest(compactness_mean~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  39.892 5.428e-10 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(concavity_mean~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  70.484 3.723e-16 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(points_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  94.906 < 2.2e-16 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(symmetry_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group   1   2.036 0.1542
##       567
```

```
leveneTest(dimension_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value  Pr(>F)
## group   1   6.113 0.01371 *
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#PCA

dim(cancer)
```

```
## [1] 569  32
```

```
attach(cancer)
head(cancer)
```

```
##         id diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1 87139402         B       12.32        12.39          78.85     464.1
## 2  8910251         B       10.60        18.95          69.28     346.4
## 3   905520         B       11.04        16.83          70.92     373.2
## 4   868871         B       11.28        13.39          73.00     384.8
## 5  9012568         B       15.19        13.21          97.65     711.8
## 6   906539         B       11.57        19.04          74.20     409.7
##   smoothness_mean compactness_mean concavity_mean points_mean
## 1         0.10280          0.06981        0.03987     0.03700
## 2         0.09688          0.11470        0.06387     0.02642
## 3         0.10770          0.07804        0.03046     0.02480
## 4         0.11640          0.11360        0.04635     0.04796
## 5         0.07963          0.06934        0.03393     0.02657
## 6         0.08546          0.07722        0.05485     0.01428
##   symmetry_mean dimension_mean radius_se texture_se perimeter_se area_se
## 1        0.1959        0.05955    0.2360     0.6656        1.670   17.43
## 2        0.1922        0.06491    0.4505     1.1970        3.430   27.10
## 3        0.1714        0.06340    0.1967     1.3870        1.342   13.54
## 4        0.1771        0.06072    0.3384     1.3430        1.851   26.33
## 5        0.1721        0.05544    0.1783     0.4125        1.338   17.72
## 6        0.2031        0.06267    0.2864     1.4400        2.206   20.30
##   smoothness_se compactness_se concavity_se points_se symmetry_se
## 1      0.008045       0.011800      0.01683  0.012410     0.01924
## 2      0.007470       0.035810      0.03354  0.013650     0.03504
## 3      0.005158       0.009355      0.01056  0.007483     0.01718
## 4      0.011270       0.034980      0.02187  0.019650     0.01580
## 5      0.005012       0.014850      0.01551  0.009155     0.01647
## 6      0.007278       0.020470      0.04447  0.008799     0.01868
##   dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1     0.002248        13.50         15.64           86.97      549.1
## 2     0.003318        11.88         22.94           78.28      424.8
## 3     0.002198        12.41         26.44           79.93      471.4
## 4     0.003442        11.92         15.77           76.53      434.0
## 5     0.001767        16.20         15.73          104.50      819.1
## 6     0.003339        13.07         26.98           86.43      520.5
##   smoothness_worst compactness_worst concavity_worst points_worst
## 1           0.1385            0.1266         0.12420      0.09391
## 2           0.1213            0.2515         0.19160      0.07926
## 3           0.1369            0.1482         0.10670      0.07431
## 4           0.1367            0.1822         0.08669      0.08611
## 5           0.1126            0.1737         0.13620      0.08178
## 6           0.1249            0.1937         0.25600      0.06664
##   symmetry_worst dimension_worst
## 1         0.2827         0.06771
## 2         0.2940         0.07587
## 3         0.2998         0.07881
## 4         0.2102         0.06784
## 5         0.2487         0.06766
## 6         0.3035         0.08284
```

```
#Get the Correlations between the measurements
cor(cancer[-2])
```

```
##                            id  radius_mean texture_mean perimeter_mean
## id                1.0000000000  0.074626470  0.099769891    0.073159412
## radius_mean       0.0746264697  1.000000000  0.323781891    0.997855281
## texture_mean      0.0997698912  0.323781891  1.000000000    0.329533059
## perimeter_mean    0.0731594119  0.997855281  0.329533059    1.000000000
## area_mean         0.0968928233  0.987357170  0.321085696    0.986506804
## smoothness_mean  -0.0129681975  0.170581187 -0.023388516    0.207278164
## compactness_mean  0.0000957011  0.506123578  0.236702222    0.556936211
## concavity_mean    0.0500799532  0.676763550  0.302417828    0.716135650
## points_mean       0.0441580956  0.822528522  0.293464051    0.850977041
## symmetry_mean    -0.0221140609  0.147741242  0.071400980    0.183027212
## dimension_mean   -0.0525114476 -0.311630826 -0.076437183   -0.261476908
## radius_se         0.1430475814  0.679090388  0.275868676    0.691765014
## texture_se       -0.0075261904 -0.097317443  0.386357623   -0.086761078
## perimeter_se      0.1373310660  0.674171616  0.281673115    0.693134890
## area_se           0.1777419152  0.735863663  0.259844987    0.744982694
## smoothness_se     0.0967805739 -0.222600125  0.006613777   -0.202694026
## compactness_se    0.0339609721  0.205999980  0.191974611    0.250743681
```

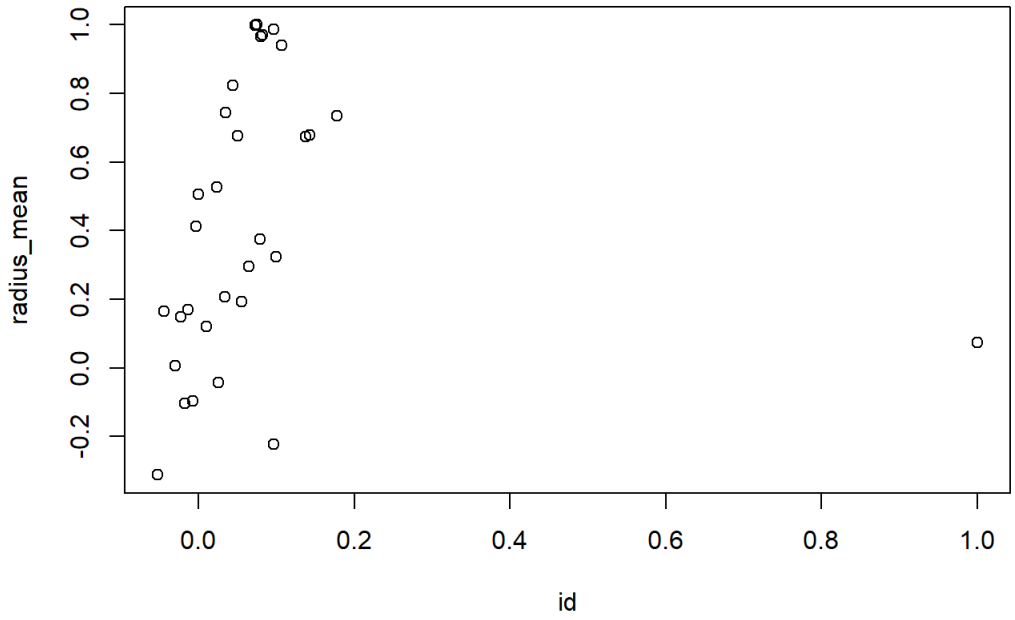
```
## concavity_se       0.0552393174  0.194203623  0.143293077    0.228082345
## points_se          0.0787680711  0.376168956  0.163851025    0.407216916
## symmetry_se       -0.0173062948 -0.104320881  0.009127168   -0.081629327
## dimension_se       0.0257253243 -0.042641269  0.054457520   -0.005523391
## radius_worst       0.0824053373  0.969538973  0.352572947    0.969476363
## texture_worst      0.0647195454  0.297007644  0.912044589    0.303038372
## perimeter_worst    0.0799858731  0.965136514  0.358039575    0.970386887
## area_worst         0.1071865233  0.941082460  0.343545947    0.941549808
## smoothness_worst   0.0103380343  0.119616140  0.077503359    0.150549404
## compactness_worst -0.0029680998  0.413462823  0.277829592    0.455774228
## concavity_worst    0.0232027439  0.526911462  0.301025224    0.563879263
## points_worst       0.0351735794  0.744214198  0.295315843    0.771240789
## symmetry_worst    -0.0442242529  0.163953335  0.105007910    0.189115040
## dimension_worst   -0.0298656360  0.007065886  0.119205351    0.051018530
##                     area_mean smoothness_mean compactness_mean
## id                 0.096892823     -0.01296820     0.0000957011
## radius_mean        0.987357170      0.17058119     0.5061235775
## texture_mean       0.321085696     -0.02338852     0.2367022221
## perimeter_mean     0.986506804      0.20727816     0.5569362109
## area_mean          1.000000000      0.17702838     0.4985016822
## smoothness_mean    0.177028377      1.00000000     0.6591232152
## compactness_mean   0.498501682      0.65912322     1.0000000000
## concavity_mean     0.685982829      0.52198377     0.8831206702
## points_mean        0.823268869      0.55369517     0.8311350431
## symmetry_mean      0.151293079      0.55777479     0.6026410484
## dimension_mean    -0.283109812      0.58479200     0.5653686634
## radius_se          0.732562227      0.30146710     0.4974734461
## texture_se        -0.066280214      0.06840645     0.0462048307
## perimeter_se       0.726628328      0.29609193     0.5489052646
## area_se            0.800085921      0.24655243     0.4556528520
## smoothness_se     -0.166776667      0.33237544     0.1352992677
## compactness_se     0.212582551      0.31894330     0.7387217897
## concavity_se       0.207660060      0.24839568     0.5705168715
## points_se          0.372320282      0.38067569     0.6422618510
## symmetry_se       -0.072496588      0.20077438     0.2299765908
## dimension_se      -0.019886963      0.28360670     0.5073181269
## radius_worst       0.962746086      0.21312014     0.5353153982
## texture_worst      0.287488627      0.03607180     0.2481328333
## perimeter_worst    0.959119574      0.23885263     0.5902104277
## area_worst         0.959213326      0.20671836     0.5096038056
## smoothness_worst   0.123522939      0.80532420     0.5655411664
## compactness_worst  0.390410309      0.47246844     0.8658090398
## concavity_worst    0.512605920      0.43492571     0.8162752498
## points_worst       0.722016626      0.50305335     0.8155732236
## symmetry_worst     0.143569914      0.39430948     0.5102234299
## dimension_worst    0.003737597      0.49931637     0.6873823228
##                   concavity_mean points_mean symmetry_mean dimension_mean
## id                    0.05007995  0.04415810   -0.02211406  -0.0525114476
## radius_mean           0.67676355  0.82252852    0.14774124  -0.3116308263
## texture_mean          0.30241783  0.29346405    0.07140098  -0.0764371834
## perimeter_mean        0.71613565  0.85097704    0.18302721  -0.2614769081
## area_mean             0.68598283  0.82326887    0.15129308  -0.2831098117
## smoothness_mean       0.52198377  0.55369517    0.55777479   0.5847920019
## compactness_mean      0.88312067  0.83113504    0.60264105   0.5653686634
## concavity_mean        1.00000000  0.92139103    0.50066662   0.3367833594
## points_mean           0.92139103  1.00000000    0.46249739   0.1669173832
## symmetry_mean         0.50066662  0.46249739    1.00000000   0.4799213301
## dimension_mean        0.33678336  0.16691738    0.47992133   1.0000000000
## radius_se             0.63192482  0.69804983    0.30337926   0.0001109951
## texture_se            0.07621835  0.02147958    0.12805293   0.1641739659
## perimeter_se          0.66039079  0.71064987    0.31389276   0.0398299316
## area_se               0.61742681  0.69029854    0.22397022  -0.0901702475
## smoothness_se         0.09856375  0.02765331    0.18732117   0.4019644254
## compactness_se        0.67027882  0.49042425    0.42165915   0.5598366906
## concavity_se          0.69127021  0.43916707    0.34262702   0.4466303217
## points_se             0.68325992  0.61563413    0.39329787   0.3411980444
## symmetry_se           0.17800921  0.09535079    0.44913654   0.3450073971
## dimension_se          0.44930075  0.25758375    0.33178615   0.6881315775
## radius_worst          0.68823641  0.83031763    0.18572775  -0.2536914949
## texture_worst         0.29987889  0.29275171    0.09065069  -0.0512692020
## perimeter_worst       0.72956492  0.85592313    0.21916856  -0.2051512113
## area_worst            0.67598723  0.80962962    0.17719338  -0.2318544512
## smoothness_worst      0.44882204  0.45275305    0.42667503   0.5049420754
```

```
## smoothness_worst      0.44682204  0.45275305    0.42667305   0.5049420754
## compactness_worst     0.75496802  0.66745368    0.47320001   0.4587981567
## concavity_worst       0.88410264  0.75239950    0.43372101   0.3462338763
## points_worst          0.86132303  0.91015531    0.43029661   0.1753254492
## symmetry_worst        0.40946413  0.37574415    0.69982580   0.3340186839
## dimension_worst       0.51492989  0.36866113    0.43841350   0.7672967792
##                      radius_se  texture_se perimeter_se     area_se
## id                0.1430475814 -0.00752619   0.13733107  0.17774192
## radius_mean       0.6790903880 -0.09731744   0.67417162  0.73586366
## texture_mean      0.2758686762  0.38635762   0.28167311  0.25984499
## perimeter_mean    0.6917650135 -0.08676108   0.69313489  0.74498269
## area_mean         0.7325622270 -0.06628021   0.72662833  0.80008592
## smoothness_mean   0.3014670983  0.06840645   0.29609193  0.24655243
## compactness_mean  0.4974734461  0.04620483   0.54890526  0.45565285
## concavity_mean    0.6319248221  0.07621835   0.66039079  0.61742681
## points_mean       0.6980498336  0.02147958   0.71064987  0.69029854
## symmetry_mean     0.3033792632  0.12805293   0.31389276  0.22397022
## dimension_mean    0.0001109951  0.16417397   0.03982993 -0.09017025
## radius_se         1.0000000000  0.21324734   0.97279368  0.95183011
## texture_se        0.2132473373  1.00000000   0.22317073  0.11156725
## perimeter_se      0.9727936770  0.22317073   1.00000000  0.93765541
## area_se           0.9518301121  0.11156725   0.93765541  1.00000000
## smoothness_se     0.1645142198  0.39724285   0.15107533  0.07515034
## compactness_se    0.3560645755  0.23169970   0.41632237  0.28484006
## concavity_se      0.3323575376  0.19499846   0.36248158  0.27089473
## points_se         0.5133464414  0.23028340   0.55626408  0.41572957
## symmetry_se       0.2405673625  0.41162068   0.26648709  0.13410898
## dimension_se      0.2277535327  0.27972275   0.24414277  0.12707090
## radius_worst      0.7150651951 -0.11169031   0.69720059  0.75737319
## texture_worst     0.1947985568  0.40900277   0.20037085  0.19649665
## perimeter_worst   0.7196838037 -0.10224192   0.72103131  0.76121264
## area_worst        0.7515484761 -0.08319499   0.73071297  0.81140796
## smoothness_worst  0.1419185529 -0.07365766   0.13005439  0.12538943
## compactness_worst 0.2871031656 -0.09243935   0.34191945  0.28325654
## concavity_worst   0.3805846346 -0.06895622   0.41889882  0.38510014
## points_worst      0.5310623278 -0.11963752   0.55489723  0.53816631
## symmetry_worst    0.0945428304 -0.12821476   0.10993043  0.07412629
## dimension_worst   0.0495594325 -0.04565457   0.08543257  0.01753930
##                  smoothness_se compactness_se concavity_se  points_se
## id                 0.096780574     0.03396097   0.05523932 0.07876807
## radius_mean       -0.222600125     0.20599998   0.19420362 0.37616896
## texture_mean       0.006613777     0.19197461   0.14329308 0.16385103
## perimeter_mean    -0.202694026     0.25074368   0.22808235 0.40721692
## area_mean         -0.166776667     0.21258255   0.20766006 0.37232028
## smoothness_mean    0.332375443     0.31894330   0.24839568 0.38067569
## compactness_mean   0.135299268     0.73872179   0.57051687 0.64226185
## concavity_mean     0.098563746     0.67027882   0.69127021 0.68325992
## points_mean        0.027653308     0.49042425   0.43916707 0.61563413
## symmetry_mean      0.187321165     0.42165915   0.34262702 0.39329787
## dimension_mean     0.401964425     0.55983669   0.44663032 0.34119804
## radius_se          0.164514220     0.35606458   0.33235754 0.51334644
## texture_se         0.397242853     0.23169970   0.19499846 0.23028340
## perimeter_se       0.151075331     0.41632237   0.36248158 0.55626408
## area_se            0.075150338     0.28484006   0.27089473 0.41572957
## smoothness_se      1.000000000     0.33669608   0.26868476 0.32842950
## compactness_se     0.336696081     1.00000000   0.80126834 0.74408267
## concavity_se       0.268684760     0.80126834   1.00000000 0.77180399
## points_se          0.328429499     0.74408267   0.77180399 1.00000000
## symmetry_se        0.413506125     0.39471283   0.30942858 0.31278022
## dimension_se       0.427374207     0.80326882   0.72737218 0.61104414
## radius_worst      -0.230690710     0.20460717   0.18690352 0.35812667
## texture_worst     -0.074742965     0.14300258   0.10024098 0.08674121
## perimeter_worst   -0.217303755     0.26051584   0.22668043 0.39499925
## area_worst        -0.182195478     0.19937133   0.18835265 0.34227116
## smoothness_worst   0.314457456     0.22739423   0.16848132 0.21535060
## compactness_worst -0.055558139     0.67878035   0.48485780 0.45288838
## concavity_worst   -0.058298387     0.63914670   0.66256413 0.54959238
## points_worst      -0.102006796     0.48320833   0.44047226 0.60244961
## symmetry_worst    -0.107342098     0.27787843   0.19778782 0.14311567
## dimension_worst    0.101480315     0.59097276   0.43932927 0.31065455
##                   symmetry_se dimension_se radius_worst texture_worst
## id                -0.017306295  0.025725324   0.08240534   0.064719545
## radius_mean       -0.104320881 -0.042641269   0.96953897   0.297007644
```

```
## texture_mean       0.009127168  0.054457520   0.35257295   0.912044589
## perimeter_mean    -0.081629327 -0.005523391   0.96947636   0.303038372
## area_mean         -0.072496588 -0.019886963   0.96274609   0.287488627
## smoothness_mean    0.200774376  0.283606699   0.21312014   0.036071799
## compactness_mean   0.229976591  0.507318127   0.53531540   0.248132833
## concavity_mean     0.178009208  0.449300749   0.68823641   0.299878889
## points_mean        0.095350787  0.257583746   0.83031763   0.292751713
## symmetry_mean      0.449136542  0.331786146   0.18572775   0.090650688
## dimension_mean     0.345007397  0.688131577  -0.25369149  -0.051269202
## radius_se          0.240567362  0.227753533   0.71506520   0.194798557
## texture_se         0.411620680  0.279722748  -0.11169031   0.409002766
## perimeter_se       0.266487092  0.244142773   0.69720059   0.200370854
## area_se            0.134108980  0.127070903   0.75737319   0.196496649
## smoothness_se      0.413506125  0.427374207  -0.23069071  -0.074742965
## compactness_se     0.394712835  0.803268818   0.20460717   0.143002583
## concavity_se       0.309428578  0.727372184   0.18690352   0.100240984
## points_se          0.312780223  0.611044139   0.35812667   0.086741210
## symmetry_se        1.000000000  0.369078083  -0.12812077  -0.077473420
## dimension_se       0.369078083  1.000000000  -0.03748762  -0.003195029
## radius_worst      -0.128120769 -0.037487618   1.00000000   0.359920754
## texture_worst     -0.077473420 -0.003195029   0.35992075   1.000000000
## perimeter_worst   -0.103753044 -0.001000398   0.99370792   0.365098245
## area_worst        -0.110342743 -0.022736147   0.98401456   0.345842283
## smoothness_worst  -0.012661800  0.170568316   0.21657443   0.225429415
## compactness_worst  0.060254879  0.390158842   0.47582004   0.360832339
## concavity_worst    0.037119049  0.379974661   0.57397471   0.368365607
## points_worst      -0.030413396  0.215204013   0.78742385   0.359754610
## symmetry_worst     0.389402485  0.111093956   0.24352920   0.233027461
## dimension_worst    0.078079476  0.591328066   0.09349198   0.219122425
##                  perimeter_worst  area_worst smoothness_worst
## id                    0.079985873  0.10718652       0.01033803
## radius_mean           0.965136514  0.94108246       0.11961614
## texture_mean          0.358039575  0.34354595       0.07750336
## perimeter_mean        0.970386887  0.94154981       0.15054940
## area_mean             0.959119574  0.95921333       0.12352294
## smoothness_mean       0.238852626  0.20671836       0.80532420
## compactness_mean      0.590210428  0.50960381       0.56554117
## concavity_mean        0.729564917  0.67598723       0.44882204
## points_mean           0.855923128  0.80962962       0.45275305
## symmetry_mean         0.219168559  0.17719338       0.42667503
## dimension_mean       -0.205151211 -0.23185445       0.50494208
## radius_se             0.719683804  0.75154848       0.14191855
## texture_se           -0.102241922 -0.08319499      -0.07365766
## perimeter_se          0.721031310  0.73071297       0.13005439
## area_se               0.761212636  0.81140796       0.12538943
## smoothness_se        -0.217303755 -0.18219548       0.31445746
## compactness_se        0.260515840  0.19937133       0.22739423
## concavity_se          0.226680426  0.18835265       0.16848132
## points_se             0.394999252  0.34227116       0.21535060
## symmetry_se          -0.103753044 -0.11034274      -0.01266180
## dimension_se         -0.001000398 -0.02273615       0.17056832
## radius_worst          0.993707916  0.98401456       0.21657443
## texture_worst         0.365098245  0.34584228       0.22542941
## perimeter_worst       1.000000000  0.97757809       0.23677460
## area_worst            0.977578091  1.00000000       0.20914533
## smoothness_worst      0.236774604  0.20914533       1.00000000
## compactness_worst     0.529407690  0.43829628       0.56818652
## concavity_worst       0.618344080  0.54333053       0.51852329
## points_worst          0.816322102  0.74741880       0.54769090
## symmetry_worst        0.269492769  0.20914551       0.49383833
## dimension_worst       0.138956862  0.07964703       0.61762419
##                  compactness_worst concavity_worst points_worst
## id                     -0.00296810      0.02320274   0.03517358
## radius_mean             0.41346282      0.52691146   0.74421420
## texture_mean            0.27782959      0.30102522   0.29531584
## perimeter_mean          0.45577423      0.56387926   0.77124079
## area_mean               0.39041031      0.51260592   0.72201663
## smoothness_mean         0.47246844      0.43492571   0.50305335
## compactness_mean        0.86580904      0.81627525   0.81557322
## concavity_mean          0.75496802      0.88410264   0.86132303
## points_mean             0.66745368      0.75239950   0.91015531
## symmetry_mean           0.47320001      0.43372101   0.43029661
## dimension_mean          0.45879816      0.34623388   0.17532545
```

```
## radius_se               0.28710317      0.38058463   0.53106233
## texture_se              -0.09243935     -0.06895622  -0.11963752
## perimeter_se             0.34191945      0.41889882   0.55489723
## area_se                  0.28325654      0.38510014   0.53816631
## smoothness_se           -0.05555814     -0.05829839  -0.10200680
## compactness_se           0.67878035      0.63914670   0.48320833
## concavity_se             0.48485780      0.66256413   0.44047226
## points_se                0.45288838      0.54959238   0.60244961
## symmetry_se              0.06025488      0.03711905  -0.03041340
## dimension_se             0.39015884      0.37997466   0.21520401
## radius_worst             0.47582004      0.57397471   0.78742385
## texture_worst            0.36083234      0.36836561   0.35975461
## perimeter_worst          0.52940769      0.61834408   0.81632210
## area_worst               0.43829628      0.54333053   0.74741880
## smoothness_worst         0.56818652      0.51852329   0.54769090
## compactness_worst        1.00000000      0.89226090   0.80108036
## concavity_worst          0.89226090      1.00000000   0.85543386
## points_worst             0.80108036      0.85543386   1.00000000
## symmetry_worst           0.61444050      0.53251973   0.50252849
## dimension_worst          0.81045486      0.68651092   0.51111415
##                    symmetry_worst dimension_worst
## id                    -0.04422425    -0.029865636
## radius_mean            0.16395333     0.007065886
## texture_mean           0.10500791     0.119205351
## perimeter_mean         0.18911504     0.051018530
## area_mean              0.14356991     0.003737597
## smoothness_mean        0.39430948     0.499316369
## compactness_mean       0.51022343     0.687382323
## concavity_mean         0.40946413     0.514929891
## points_mean            0.37574415     0.368661134
## symmetry_mean          0.69982580     0.438413498
## dimension_mean         0.33401868     0.767296779
## radius_se              0.09454283     0.049559432
## texture_se            -0.12821476    -0.045654569
## perimeter_se           0.10993043     0.085432572
## area_se                0.07412629     0.017539295
## smoothness_se         -0.10734210     0.101480315
## compactness_se         0.27787843     0.590972763
## concavity_se           0.19778782     0.439329269
## points_se              0.14311567     0.310654551
## symmetry_se            0.38940248     0.078079476
## dimension_se           0.11109396     0.591328066
## radius_worst           0.24352920     0.093491979
## texture_worst          0.23302746     0.219122425
## perimeter_worst        0.26949277     0.138956862
## area_worst             0.20914551     0.079647034
## smoothness_worst       0.49383833     0.617624192
## compactness_worst      0.61444050     0.810454856
## concavity_worst        0.53251973     0.686510921
## points_worst           0.50252849     0.511114146
## symmetry_worst         1.00000000     0.537848206
## dimension_worst        0.53784821     1.000000000
```

```
c <- (cor(cancer[-2]))
plot(c)
```




```
# Using prcomp to compute the principal components (eigenvalues and eigenvectors). With scale=TRUE, variable means are set to zero, and variances set to one
cancer_pca <- prcomp(cancer[,-2],scale=TRUE)
cancer_pca
```

```
## Standard deviations (1, .., p=31):
##  [1] 3.64527878 2.38679814 1.68386313 1.40760690 1.28406203 1.11115827
##  [7] 0.98907696 0.81960537 0.67881693 0.63492763 0.59089337 0.54211662
## [13] 0.51102537 0.49125372 0.39619900 0.30680373 0.28250655 0.24299439
## [19] 0.22932770 0.22163467 0.17626907 0.17303527 0.16562163 0.15572098
## [25] 0.13431069 0.12441756 0.09039745 0.08305482 0.03986650 0.02735646
## [31] 0.01153431
##
## Rotation (n x k) = (31 x 31):
##                             PC1           PC2           PC3           PC4
## id                 -0.02291216  0.034068491  0.096938436 -0.026598045
## radius_mean        -0.21891302  0.233271401 -0.011393786  0.042187950
## texture_mean       -0.10384388  0.060044199  0.066892342 -0.602954308
## perimeter_mean     -0.22753491  0.214589002 -0.012124791  0.042752797
## area_mean          -0.22104577  0.230668816  0.026293150  0.054114724
## smoothness_mean    -0.14241471 -0.186422211 -0.103182400  0.158098177
## compactness_mean   -0.23906730 -0.152454726 -0.074768623  0.031818117
## concavity_mean     -0.25828025 -0.060541625  0.001758736  0.019497124
## points_mean        -0.26073811  0.034167392 -0.027579607  0.065785353
## symmetry_mean      -0.13797774 -0.190684979 -0.040962032  0.067502543
## dimension_mean     -0.06414779 -0.366531055 -0.020817875  0.047957856
## radius_se          -0.20611747  0.105935702  0.266917221  0.099114446
## texture_se         -0.01741339 -0.089547789  0.371439885 -0.356497230
## perimeter_se       -0.21144652  0.089807043  0.264925682  0.090293055
## area_se            -0.20307642  0.152771289  0.215790250  0.108568705
## smoothness_se      -0.01467821 -0.203189876  0.311787845  0.044368664
## compactness_se     -0.17028840 -0.232503362  0.154557465 -0.026425360
## concavity_se       -0.15354367 -0.196846081  0.176560052  0.002248291
## points_se          -0.18340675 -0.129965181  0.223850479  0.075252232
## symmetry_se        -0.04241552 -0.183558627  0.285265066  0.046936126
## dimension_se       -0.10249607 -0.279584139  0.211893354  0.016212450
## radius_worst       -0.22800935  0.219296044 -0.049406340  0.015659705
## texture_worst      -0.10451545  0.045501223 -0.039828934 -0.633119655
## perimeter_worst    -0.23663734  0.199295985 -0.050431945  0.014068572
## area_worst         -0.22493214  0.218985461 -0.013188891  0.025970672
## smoothness_worst   -0.12782441 -0.172562959 -0.255328751  0.014523359
## compactness_worst -0.20988456 -0.144253637 -0.234513609 -0.092562168
## concavity_worst    -0.22860218 -0.098526524 -0.172024941 -0.074807188
## points_worst       -0.25074620  0.007534367 -0.170480673  0.005305980
```

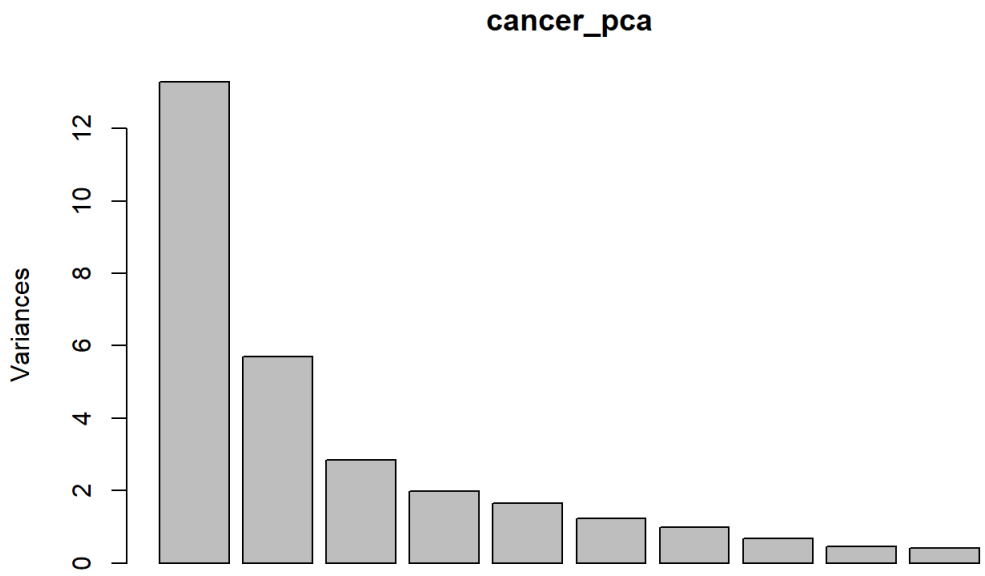
```
## symmetry_worst    -0.12267993 -0.142619436 -0.270515902 -0.037129466
## dimension_worst   -0.13156024 -0.275702077 -0.229474476 -0.078971489
##                          PC5          PC6           PC7          PC8
## id                 0.011327587 -0.316733438  0.9071156324 -0.096362415
## radius_mean       -0.038129861  0.029588521 -0.0422987777 -0.116427419
## texture_mean       0.049091450 -0.031394323  0.0149935618  0.001875482
## perimeter_mean    -0.037715592  0.028394008 -0.0435888242 -0.106272097
## area_mean         -0.010562229  0.006113155 -0.0289256668 -0.047414568
## smoothness_mean    0.365750055 -0.262508993 -0.1403403617 -0.123541189
## compactness_mean  -0.011786637 -0.004903894 -0.0453031106  0.043145968
## concavity_mean    -0.086512506 -0.002356338 -0.0325530646 -0.102436021
## points_mean        0.043667412 -0.034509273 -0.0814216298 -0.136923237
## symmetry_mean      0.305378893  0.335082168  0.1182592361 -0.098874531
## dimension_mean     0.044767906 -0.112784169 -0.0410588768  0.306499872
## radius_se          0.154254367 -0.023261199  0.0167882718  0.307415709
## texture_se         0.190001500  0.022856912 -0.1902676469 -0.052632477
## perimeter_se       0.120703357  0.003820151  0.0195081762  0.311265679
## area_se            0.127765023 -0.051958835  0.0565606078  0.334287959
## smoothness_se      0.232745603 -0.330867850 -0.0678348099 -0.260833914
## compactness_se    -0.280298048  0.066788120  0.0222220211  0.021001944
## concavity_se      -0.354164595  0.049699104  0.0336810725 -0.219193299
## points_se         -0.195758558 -0.023197526 -0.0378517870 -0.370217167
## symmetry_se        0.251331178  0.477530515  0.1184032606 -0.084854768
## dimension_se      -0.263395188 -0.048462373 -0.0157602244  0.194418818
## radius_worst       0.004280034  0.004521737 -0.0166458140 -0.007508307
## texture_worst      0.092551860 -0.045174516 -0.0094601240  0.006617640
## perimeter_worst   -0.007599144  0.012921166 -0.0145260986  0.002162488
## area_worst         0.027413595 -0.024033338 -0.0007372602  0.066173186
## smoothness_worst   0.325860028 -0.365048687 -0.0670682168 -0.116496117
## compactness_worst -0.121503371  0.034042714  0.0507556727  0.136509363
## concavity_worst   -0.188280510  0.017962040  0.0352007117 -0.067085744
## points_worst      -0.043123573 -0.029549100 -0.0207238959 -0.166500918
## symmetry_worst     0.244245936  0.451404312  0.2340143294 -0.041439633
## dimension_worst   -0.093699078 -0.092479698  0.0347167538  0.372034479
##                          PC9         PC10          PC11         PC12
## id                 0.149115642 -0.16926751  0.058188997 -0.006721252
## radius_mean       -0.046270835 -0.22402704 -0.079466081 -0.042213788
## texture_mean      -0.088727168  0.11945674 -0.253258091  0.304032359
## perimeter_mean    -0.036230738 -0.22634517 -0.069865929 -0.017573055
## area_mean         -0.080649856 -0.18600385 -0.062795372 -0.110760120
## smoothness_mean    0.278996404 -0.06133822  0.084661549  0.135321954
## compactness_mean   0.099214048 -0.19518602  0.005172841  0.307036205
## concavity_mean     0.075750464  0.03395563  0.134664686 -0.124553100
## points_mean        0.116569072 -0.14261678  0.006124860  0.071564686
## symmetry_mean      0.315150303  0.13561452 -0.574417320 -0.161058144
## dimension_mean     0.130639482 -0.15848117 -0.066456112  0.037318709
## radius_se          0.026200456  0.26504403  0.025847282  0.027030250
## texture_se         0.372989606 -0.31521084  0.323158815 -0.348396233
## perimeter_se       0.052860114  0.23789288  0.094867442  0.168501485
## area_se           -0.030627892  0.24966405  0.071991560 -0.050731496
## smoothness_se     -0.580789293 -0.01015980 -0.179568831 -0.081753374
## compactness_se    -0.148593714 -0.11518343 -0.038615749  0.206959272
## concavity_se       0.034715098  0.36592141  0.113536362 -0.348342358
## points_se          0.189022962  0.21518752 -0.094066850  0.342855186
## symmetry_se       -0.292785738 -0.22049558  0.328314881  0.185998712
## dimension_se      -0.060203202 -0.22637997 -0.353844543 -0.250428852
## radius_worst      -0.070224590 -0.09981025 -0.073013014 -0.105030701
## texture_worst     -0.008571809  0.10669296 -0.038561250 -0.012490348
## perimeter_worst   -0.058854223 -0.09821693 -0.045750979 -0.051125158
## area_worst        -0.097034650 -0.06179787 -0.068822329 -0.184460981
## smoothness_worst  -0.173257498  0.16912753  0.109278029 -0.142996001
## compactness_worst -0.111218083 -0.06445290  0.175401648  0.196805544
## concavity_worst   -0.035467377  0.19661986  0.295581609 -0.184959562
## points_worst       0.052322473  0.05121611  0.075496752  0.117518361
## symmetry_worst    -0.188266324  0.10308901  0.019223451 -0.157210098
## dimension_worst   -0.087222442 -0.11291399 -0.007071634 -0.118625115
##                         PC13         PC14          PC15         PC16
## id                -0.004841084 -0.006500099  0.006885943 -0.002753492
## radius_mean        0.050603927 -0.012496988 -0.059054553  0.050789156
## texture_mean       0.256273666 -0.201876125  0.020701124  0.108089530
## perimeter_mean     0.038470392 -0.044684430 -0.048019221  0.039590476
## area_mean          0.065047550 -0.067879244 -0.010152279 -0.014636050
## smoothness_mean    0.315872261 -0.046461624 -0.444044654  0.117493291
```

```
## compactness_mean  -0.104264618 -0.230005458 -0.007661166 -0.230759682
## concavity_mean     0.065723393 -0.387349680  0.189733740  0.128386008
## points_mean        0.042253113 -0.132637847  0.245219266  0.217299938
## symmetry_mean     -0.288054252 -0.189570545 -0.030903840  0.073950596
## dimension_mean     0.236120382 -0.106390748  0.377436108 -0.518333769
## radius_se         -0.015625578  0.069635807 -0.011959877  0.111103952
## texture_se        -0.308499115  0.165408488  0.012614192 -0.033389049
## perimeter_se      -0.100597125  0.038865462  0.044358477  0.008991734
## area_se           -0.017226446 -0.055687709 -0.083203050  0.045171638
## smoothness_se     -0.293287983 -0.149148603  0.200139961 -0.018414232
## compactness_se    -0.263398426 -0.010320713 -0.491903153 -0.167886977
## concavity_se       0.251864823 -0.157777595 -0.135322845 -0.250292522
## points_se         -0.006430584  0.494527095  0.199547389 -0.062548716
## symmetry_se        0.319874237 -0.010836031  0.047340593  0.113219397
## dimension_se       0.275943072  0.240767973 -0.145958050  0.353782637
## radius_worst       0.039582217  0.138036550 -0.023526025 -0.166213790
## texture_worst      0.080142089  0.080737140 -0.053897961 -0.100862417
## perimeter_worst   -0.009084762  0.097004376 -0.012559001 -0.182407021
## area_worst         0.047986766  0.101235629  0.006646192 -0.315142865
## smoothness_worst   0.056931408  0.206026671 -0.163389545 -0.045226715
## compactness_worst -0.371991007 -0.013117334 -0.165941776  0.049613607
## concavity_worst   -0.086870368 -0.218055908  0.066854662  0.204743734
## points_worst      -0.068367254  0.254345228  0.276401728  0.169597618
## symmetry_worst     0.043937722  0.256766084 -0.005448734 -0.139913723
## dimension_worst   -0.035134642  0.172524501  0.212520491  0.255448214
##                         PC17         PC18         PC19         PC20
## id                -0.007779983 -0.019707372  0.005442248  0.020454908
## radius_mean        0.150008977  0.209908003 -0.156773206  0.211821385
## texture_mean       0.159152972 -0.034161758  0.040048687  0.029931705
## perimeter_mean     0.113792993  0.201233658 -0.168413120  0.227079273
## area_mean          0.130173978  0.251460456 -0.269145594 -0.045499625
## smoothness_mean    0.203117911  0.168171613  0.354463321 -0.160358262
## compactness_mean  -0.170379447 -0.016302860 -0.014259132  0.292092522
## concavity_mean    -0.270010606 -0.005071590  0.027973937  0.007197446
## points_mean       -0.381111880  0.028741889  0.087065594 -0.153991624
## symmetry_mean      0.165691481 -0.194702559 -0.169168737 -0.058503329
## dimension_mean     0.039119713  0.046298986 -0.086779501 -0.062879947
## radius_se         -0.055118880 -0.124562479  0.231233991  0.181436577
## texture_se         0.032768777  0.041652813  0.009177450  0.038681291
## perimeter_se      -0.023929011 -0.009084130  0.014508488  0.364045783
## area_se           -0.045538238  0.313148246 -0.296273515 -0.433949999
## smoothness_se      0.058326686  0.145306166  0.228819703 -0.013932678
## compactness_se    -0.190065826 -0.015610691 -0.094108380 -0.250216687
## concavity_se       0.126034946  0.092345618 -0.005794297  0.119490304
## points_se          0.197671940  0.106747906 -0.046944796 -0.015851066
## symmetry_se        0.158541381 -0.279918359 -0.180195394 -0.084242460
## dimension_se      -0.267180143 -0.122002438  0.059970839  0.097082660
## radius_worst       0.083459877 -0.235215809  0.218781792  0.027741137
## texture_worst     -0.185972310  0.065992656 -0.057250572 -0.080880841
## perimeter_worst    0.056649279 -0.228493742  0.189279122  0.105666112
## area_worst         0.090325036 -0.286471546  0.158722686 -0.393681440
## smoothness_worst  -0.142781922 -0.276751162 -0.504565504  0.228506719
## compactness_worst  0.153347954 -0.003683424  0.073627229  0.025544372
## concavity_worst    0.216302398 -0.190307542  0.107894455 -0.035839305
## points_worst      -0.178353485 -0.085180057 -0.067182996 -0.261323873
## symmetry_worst    -0.260033510  0.436706158  0.269313654  0.111738683
## dimension_worst    0.404957673  0.162920272 -0.026674889 -0.022516600
##                         PC21         PC22         PC23         PC24
## id                 0.009870917  0.006195707  0.003190337 -0.010289027
## radius_mean        0.046009507  0.070394387 -0.073021974 -0.098704322
## texture_mean       0.264801220 -0.436269565 -0.095890704  0.001311285
## perimeter_mean     0.015122205  0.070963404 -0.074821704 -0.040500943
## area_mean          0.087345298  0.021672998 -0.097428804  0.009396470
## smoothness_mean   -0.023842011  0.117945821 -0.063741313 -0.020088204
## compactness_mean  -0.476395571 -0.213187888  0.094254664  0.058295270
## concavity_mean     0.037771062 -0.001270114  0.188862925  0.321062737
## points_mean        0.231546040  0.017493297  0.313280824 -0.057974684
## symmetry_mean     -0.030776761  0.085067786  0.018331111 -0.052004767
## dimension_mean     0.172565576  0.085104005 -0.286892578 -0.084701081
## radius_se          0.090564458 -0.085660592  0.147793165 -0.263799753
## texture_se         0.083589382 -0.212168357 -0.048761201 -0.001150858
## perimeter_se       0.169586632  0.317246026 -0.153859020  0.081384223
## area_se           -0.270679518 -0.207916141 -0.068745790  0.110258620
```

```
## area_se             0.270079510  0.207910141  0.060165790  0.110250020
## smoothness_se      -0.095370809  0.066602974 -0.051852247 -0.057154068
## compactness_se      0.451033960  0.159332265  0.048970757  0.003993806
## concavity_se       -0.070203251 -0.071023842  0.200850815 -0.388573085
## points_se          -0.064848884 -0.035557778  0.074494143  0.354040783
## symmetry_se        -0.112133933  0.092193625  0.084324570 -0.043455477
## dimension_se       -0.214213177 -0.069171668 -0.245408452  0.089594196
## radius_worst        0.006481267 -0.007068180  0.096292694 -0.057768458
## texture_worst      -0.330244412  0.578095532  0.111968438 -0.009473435
## perimeter_worst    -0.010544107  0.094457678 -0.014952244  0.058698441
## area_worst         -0.053510824 -0.149328216  0.096798702  0.193293235
## smoothness_worst    0.140127867 -0.156936236  0.069660581  0.091134610
## compactness_worst -0.220884131 -0.191897773 -0.033373706 -0.145389941
## concavity_worst     0.047166544  0.139729448 -0.456817799  0.290302924
## points_worst       -0.039740929 -0.006870640 -0.305694162 -0.563297713
## symmetry_worst      0.125617213 -0.155827542 -0.096426675  0.122996111
## dimension_worst     0.095366679  0.092769737  0.470358007  0.002775112
##                           PC25        PC26         PC27         PC28
## id                 -0.004233388 -0.00132610 -0.002571324 -0.001623875
## radius_mean        -0.183664583  0.01859418  0.128713229  0.131697326
## texture_mean        0.099441545 -0.08442059  0.024821224  0.017622634
## perimeter_mean     -0.117262178 -0.02743488  0.124670225  0.115650274
## area_mean           0.070557041  0.21057100 -0.361014547 -0.467489167
## smoothness_mean     0.068940049 -0.02876100  0.037372832 -0.069482805
## compactness_mean   -0.102198309 -0.39651346 -0.262695425 -0.098624638
## concavity_mean      0.045550527  0.09717977  0.550227716 -0.363040016
## points_mean         0.082349955  0.18630114 -0.389316679  0.453345398
## symmetry_mean       0.018841491  0.02451053  0.015910368  0.015157593
## dimension_mean     -0.134601525  0.20670502  0.096796804  0.101343150
## radius_se          -0.561133900  0.17339784 -0.050411953 -0.213735821
## texture_se          0.023938591 -0.05709165  0.010893175  0.009925699
## perimeter_se        0.516048248 -0.07217201 -0.103485879 -0.041989200
## area_se            -0.018546693 -0.13093723  0.155929011  0.314758068
## smoothness_se       0.016193934 -0.03100551  0.008066566  0.009312365
## compactness_se     -0.122457873 -0.17364984  0.049404535 -0.046651501
## concavity_se        0.186159613 -0.01600952 -0.091931364  0.083824645
## points_se          -0.107166573  0.12999049  0.018674110  0.011675700
## symmetry_se         0.002613811  0.01936313  0.016991197  0.019891112
## dimension_se        0.076177800  0.08458109 -0.035156906  0.012141785
## radius_worst       -0.158114412 -0.07144112  0.195812320  0.178796461
## texture_worst      -0.118609952  0.11802219 -0.036347107 -0.021473842
## perimeter_worst     0.236463109 -0.11790535  0.243266456  0.241658719
## area_worst          0.146339946  0.03921251 -0.229813188 -0.237323945
## smoothness_worst   -0.011224935  0.04787154 -0.012860335  0.040730207
## compactness_worst   0.185437121  0.62471727  0.100772153  0.071087434
## concavity_worst    -0.286701322 -0.11586768 -0.267236886  0.142148446
## points_worst        0.105286798 -0.26352782  0.133749940 -0.230794105
## symmetry_worst     -0.013193455 -0.04505357 -0.027824916 -0.022695808
## dimension_worst     0.037882167 -0.28015574 -0.004500884 -0.060081371
##                           PC29          PC30          PC31
## id                 -1.891724e-05 -0.0006852263 -7.122581e-05
## radius_mean         2.111968e-01 -0.2114371011 -7.024325e-01
## texture_mean       -6.362507e-05  0.0106165839 -2.644366e-04
## perimeter_mean      8.434280e-02 -0.3838889617  6.898676e-01
## area_mean          -2.725167e-01  0.4227208085  3.297173e-02
## smoothness_mean     1.480038e-03  0.0034638648  4.850746e-03
## compactness_mean   -5.466656e-03  0.0409079834 -4.468229e-02
## concavity_mean      4.554138e-02  0.0101122808 -2.512860e-02
## points_mean        -8.885707e-03  0.0041142627  1.067984e-03
## symmetry_mean       1.432581e-03  0.0075571475  1.279594e-03
## dimension_mean     -6.312291e-03 -0.0073311823  4.751885e-03
## radius_se          -1.922290e-01 -0.1186768422  8.679321e-03
## texture_se         -5.624974e-03  0.0086942153  1.063104e-03
## perimeter_se        2.631905e-01  0.0060612569 -1.373310e-02
## area_se            -4.205668e-02  0.0863645419 -1.054698e-03
## smoothness_se       9.795835e-03 -0.0016737982  1.618711e-03
## compactness_se     -1.539757e-02 -0.0032295613 -1.923037e-03
## concavity_se        5.819985e-03 -0.0161202167  8.921294e-03
## points_se          -2.900497e-02  0.0241014722  2.178643e-03
## symmetry_se        -7.637856e-03  0.0051771158 -3.338380e-04
## dimension_se        1.975791e-02  0.0083971145 -1.792802e-03
## radius_worst        4.126296e-01  0.6356796555  1.356846e-01
## texture_worst      -3.896988e-04 -0.0172219636 -1.020237e-03
```

```
## perimeter_worst   -7.286790e-01 -0.0228830657 -7.974244e-02
## area_worst         2.389679e-01 -0.4448733182 -3.976788e-02
## smoothness_worst  -1.535941e-03 -0.0074142082 -4.586820e-03
## compactness_worst  4.869512e-02  0.0001075081  1.285262e-02
## concavity_worst   -1.764174e-02  0.0126547542 -4.031809e-04
## points_worst       2.247340e-02 -0.0353341030  2.276561e-03
## symmetry_worst     4.922100e-03 -0.0133523613 -3.910451e-04
## dimension_worst   -2.356283e-02 -0.0115053741 -1.897779e-03
```

```
plot(cancer_pca)
```




```
summary(cancer_pca)
```

```
## Importance of components:
##                           PC1    PC2     PC3     PC4     PC5     PC6
## Standard deviation     3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion  0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##                           PC7     PC8     PC9    PC10    PC11    PC12
## Standard deviation     0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion  0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##                           PC13    PC14    PC15    PC16    PC17   PC18
## Standard deviation     0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion  0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##                           PC19    PC20   PC21    PC22    PC23    PC24
## Standard deviation     0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion  0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##                           PC25   PC26    PC27    PC28    PC29    PC30
## Standard deviation     0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion  0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##                           PC31
## Standard deviation     0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion  1.00000
```

```
#View(cancer_pca)
head(cancer_pca$x)
```

```
##            PC1         PC2        PC3        PC4         PC5        PC6
## [1,] 2.501946 -0.09694805 -0.4489597  2.3341176  0.69771548 -0.2430058
## [2,] 1.467439 -1.68630059  1.1542039  0.3362109  0.45962538  1.2308248
## [3,] 2.929028 -0.38319924 -0.8955891 -0.1164828  0.98441377 -0.2587872
## [4,] 1.995342 -1.33046592  1.1172876  2.0502761  0.25303846 -1.5539634
## [5,] 2.500252  2.01035097 -0.7584035  1.9862169 -1.13537096  0.5940361
## [6,] 2.018308 -0.78242095  0.1125197 -0.6532280  0.01841577  0.6914453
##             PC7         PC8        PC9        PC10       PC11        PC12
## [1,]  0.5092015 -1.11423307  0.2840243  0.32463197 -0.3245353  0.04981306
## [2,]  0.2937434  0.10000461 -0.0668399  0.42612180  0.4564029  1.19357566
## [3,] -0.3303385  0.03599041  0.8734350  0.02222192  0.4208602 -0.06687286
## [4,] -0.9692185 -1.31852134  0.6254396  0.05666470 -0.0691646  0.97082409
## [5,]  0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533  0.03266208
## [6,]  0.1454026  0.06214539  0.2342454  0.73681239 -0.3671239 -0.77029743
##             PC13        PC14         PC15        PC16        PC17
## [1,] -0.19760220  0.1134403 -0.059302558  0.16637723 -0.04286656
## [2,]  0.01807424 -0.2824292 -0.204858888 -0.07067959  0.03088787
## [3,]  0.37435458  0.2585457 -0.330274216 -0.13000189 -0.24616091
## [4,] -0.90968379  0.2179117 -0.665825669  0.10213387 -0.10289446
## [5,] -0.35547138 -0.1480140 -0.005540503 -0.06495881  0.22273309
## [6,] -0.49542291 -0.2992431  0.049952835 -0.20161083  0.14920422
##              PC18        PC19        PC20        PC21        PC22
## [1,] -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## [2,] -0.405534243 -0.02886103 -0.05262226 -0.05987170  0.05868642
## [3,]  0.327711259  0.15937793 -0.13804895 -0.13489743  0.10080029
## [4,]  0.197085181  0.36251771 -0.40018239 -0.10302093 -0.28821708
## [5,] -0.129129156 -0.35877054  0.08515543 -0.08500541 -0.06332008
## [6,] -0.002229379 -0.08178568  0.18970936 -0.06872875  0.09669594
##              PC23         PC24         PC25        PC26         PC27
## [1,] -0.038971937  0.062212075  0.088438866  0.04872948 -0.007000724
## [2,]  0.070978613 -0.030822339 -0.016741580  0.04173030 -0.059332996
## [3,]  0.053909008  0.085484364  0.038277664 -0.04151896 -0.035546410
## [4,]  0.182045907  0.222848059 -0.115720065 -0.03676948 -0.148171674
## [5,]  0.043591030  0.008165322  0.002738052  0.05983731  0.046167735
## [6,] -0.001458054 -0.031338348  0.042784223 -0.08646068 -0.030944690
##             PC28         PC29         PC30         PC31
## [1,]  0.05356131  0.015184882  0.015985406  0.001396101
## [2,] -0.18696553  0.027011311 -0.000803330  0.008096490
## [3,] -0.07653067 -0.014640388  0.010307894  0.009074601
## [4,] -0.01711665 -0.047828494  0.023862995  0.000265075
## [5,]  0.03835364  0.032450800 -0.002312178 -0.002563269
## [6,]  0.00955434 -0.004403431  0.003869919 -0.002931194
```

```
# sample scores stored in cancer_pca$x
# singular values (square roots of eigenvalues) stored in cancer_pca$sdev
# loadings (eigenvectors) are stored in cancer_pca$rotation
# variable means stored in cancer_pca$center
# variable standard deviations stored in sparrows_pca$scale
# A table containing eigenvalues and %'s accounted, follows
# Eigenvalues are sdev^2
(eigen_cancer <- cancer_pca$sdev^2) ## brackets for print
```

```
##  [1] 1.328806e+01 5.696805e+00 2.835395e+00 1.981357e+00 1.648815e+00
##  [6] 1.234673e+00 9.782732e-01 6.717530e-01 4.607924e-01 4.031331e-01
## [11] 3.491550e-01 2.938904e-01 2.611469e-01 2.413302e-01 1.569736e-01
## [16] 9.412853e-02 7.980995e-02 5.904627e-02 5.259119e-02 4.912193e-02
## [21] 3.107078e-02 2.994121e-02 2.743052e-02 2.424902e-02 1.803936e-02
## [26] 1.547973e-02 8.171699e-03 6.898103e-03 1.589338e-03 7.483761e-04
## [31] 1.330402e-04
```

```
names(eigen_cancer) <- paste("PC",1:31,sep="")
eigen_cancer
```

```
##          PC1          PC2          PC3          PC4          PC5
## 1.328806e+01 5.696805e+00 2.835395e+00 1.981357e+00 1.648815e+00
##          PC6          PC7          PC8          PC9         PC10
## 1.234673e+00 9.782732e-01 6.717530e-01 4.607924e-01 4.031331e-01
##         PC11         PC12         PC13         PC14         PC15
## 3.491550e-01 2.938904e-01 2.611469e-01 2.413302e-01 1.569736e-01
##         PC16         PC17         PC18         PC19         PC20
## 9.412853e-02 7.980995e-02 5.904627e-02 5.259119e-02 4.912193e-02
##         PC21         PC22         PC23         PC24         PC25
## 3.107078e-02 2.994121e-02 2.743052e-02 2.424902e-02 1.803936e-02
##         PC26         PC27         PC28         PC29         PC30
## 1.547973e-02 8.171699e-03 6.898103e-03 1.589338e-03 7.483761e-04
##         PC31
## 1.330402e-04
```

```
sumlambdas <- sum(eigen_cancer)
sumlambdas
```

```
## [1] 31
```

```
propvar <- eigen_cancer/sumlambdas
propvar
```

```
##          PC1          PC2          PC3          PC4          PC5
## 4.286470e-01 1.837679e-01 9.146436e-02 6.391475e-02 5.318759e-02
##          PC6          PC7          PC8          PC9         PC10
## 3.982815e-02 3.155720e-02 2.166945e-02 1.486427e-02 1.300429e-02
##         PC11         PC12         PC13         PC14         PC15
## 1.126306e-02 9.480337e-03 8.424094e-03 7.784846e-03 5.063666e-03
##         PC16         PC17         PC18         PC19         PC20
## 3.036404e-03 2.574514e-03 1.904718e-03 1.696490e-03 1.584578e-03
##         PC21         PC22         PC23         PC24         PC25
## 1.002283e-03 9.658453e-04 8.848556e-04 7.822265e-04 5.819149e-04
##         PC26         PC27         PC28         PC29         PC30
## 4.993461e-04 2.636032e-04 2.225194e-04 5.126895e-05 2.414116e-05
##         PC31
## 4.291620e-06
```

```
summary(eigen_cancer)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
##  0.000133  0.025840  0.094129  1.000000  0.566273 13.288057
```

```
summary(cancer_pca)
```

```
## Importance of components:
##                           PC1    PC2     PC3     PC4     PC5     PC6
## Standard deviation     3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion  0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##                           PC7     PC8     PC9    PC10    PC11    PC12
## Standard deviation     0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion  0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##                           PC13    PC14    PC15    PC16    PC17   PC18
## Standard deviation     0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion  0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##                           PC19    PC20   PC21    PC22    PC23    PC24
## Standard deviation     0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion  0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##                           PC25   PC26    PC27    PC28    PC29    PC30
## Standard deviation     0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion  0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##                           PC31
## Standard deviation     0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion  1.00000
```

```
cumvar_cancer <- cumsum(propvar)
cumvar_cancer
```

```
##       PC1       PC2       PC3       PC4       PC5       PC6       PC7
## 0.4286470 0.6124149 0.7038793 0.7677940 0.8209816 0.8608098 0.8923670
##       PC8       PC9      PC10      PC11      PC12      PC13      PC14
## 0.9140364 0.9289007 0.9419050 0.9531681 0.9626484 0.9710725 0.9788573
##      PC15      PC16      PC17      PC18      PC19      PC20      PC21
## 0.9839210 0.9869574 0.9895319 0.9914366 0.9931331 0.9947177 0.9957200
##      PC22      PC23      PC24      PC25      PC26      PC27      PC28
## 0.9966858 0.9975707 0.9983529 0.9989348 0.9994342 0.9996978 0.9999203
##      PC29      PC30      PC31
## 0.9999716 0.9999957 1.0000000
```

```
matlambdas <- rbind(eigen_cancer,propvar,cumvar_cancer)
rownames(matlambdas) <- c("Eigenvalues","Prop. variance","Cum. prop. variance")
round(matlambdas,4)
```

```
##                          PC1    PC2    PC3    PC4    PC5    PC6    PC7
## Eigenvalues          13.2881 5.6968 2.8354 1.9814 1.6488 1.2347 0.9783
## Prop. variance        0.4286 0.1838 0.0915 0.0639 0.0532 0.0398 0.0316
## Cum. prop. variance   0.4286 0.6124 0.7039 0.7678 0.8210 0.8608 0.8924
##                          PC8    PC9   PC10   PC11   PC12   PC13   PC14
## Eigenvalues          0.6718 0.4608 0.4031 0.3492 0.2939 0.2611 0.2413
## Prop. variance       0.0217 0.0149 0.0130 0.0113 0.0095 0.0084 0.0078
## Cum. prop. variance 0.9140 0.9289 0.9419 0.9532 0.9626 0.9711 0.9789
##                         PC15   PC16   PC17   PC18   PC19   PC20   PC21
## Eigenvalues          0.1570 0.0941 0.0798 0.0590 0.0526 0.0491 0.0311
## Prop. variance       0.0051 0.0030 0.0026 0.0019 0.0017 0.0016 0.0010
## Cum. prop. variance 0.9839 0.9870 0.9895 0.9914 0.9931 0.9947 0.9957
##                         PC22   PC23   PC24   PC25   PC26   PC27   PC28
## Eigenvalues          0.0299 0.0274 0.0242 0.0180 0.0155 0.0082 0.0069
## Prop. variance       0.0010 0.0009 0.0008 0.0006 0.0005 0.0003 0.0002
## Cum. prop. variance 0.9967 0.9976 0.9984 0.9989 0.9994 0.9997 0.9999
##                         PC29  PC30  PC31
## Eigenvalues          0.0016 7e-04 1e-04
## Prop. variance       0.0001 0e+00 0e+00
## Cum. prop. variance 1.0000 1e+00 1e+00
```

```
summary(cancer_pca)
```

```
## Importance of components:
##                           PC1    PC2     PC3     PC4     PC5     PC6
## Standard deviation     3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion  0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##                           PC7     PC8     PC9    PC10    PC11    PC12
## Standard deviation     0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion  0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##                           PC13    PC14    PC15    PC16    PC17   PC18
## Standard deviation     0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion  0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##                           PC19    PC20   PC21    PC22    PC23    PC24
## Standard deviation     0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion  0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##                           PC25   PC26    PC27    PC28    PC29    PC30
## Standard deviation     0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion  0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##                           PC31
## Standard deviation     0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion  1.00000
```

```
cancer_pca$rotation
```

```
##                             PC1           PC2           PC3           PC4
## id                 -0.02291216  0.034068491  0.096938436 -0.026598045
## radius_mean        -0.21891302  0.233271401 -0.011393786  0.042187950
## texture_mean       -0.10384388  0.060044199  0.066892342 -0.602954308
## perimeter_mean     -0.22753491  0.214589002 -0.012124791  0.042752797
## area_mean          -0.22104577  0.230668816  0.026293150  0.054114724
## smoothness_mean    -0.14241471 -0.186422211 -0.103182400  0.158098177
## compactness_mean   -0.23906730 -0.152454726 -0.074768623  0.031818117
## concavity_mean     -0.25828025 -0.060541625  0.001758736  0.019497124
## points_mean        -0.26073811  0.034167392 -0.027579607  0.065785353
## symmetry_mean      -0.13797774 -0.190684979 -0.040962032  0.067502543
## dimension_mean     -0.06414779 -0.366531055 -0.020817875  0.047957856
## radius_se          -0.20611747  0.105935702  0.266917221  0.099114446
## texture_se         -0.01741339 -0.089547789  0.371439885 -0.356497230
## perimeter_se       -0.21144652  0.089807043  0.264925682  0.090293055
## area_se            -0.20307642  0.152771289  0.215790250  0.108568705
## smoothness_se      -0.01467821 -0.203189876  0.311787845  0.044368664
## compactness_se     -0.17028840 -0.232503362  0.154557465 -0.026425360
## concavity_se       -0.15354367 -0.196846081  0.176560052  0.002248291
## points_se          -0.18340675 -0.129965181  0.223850479  0.075252232
## symmetry_se        -0.04241552 -0.183558627  0.285265066  0.046936126
## dimension_se       -0.10249607 -0.279584139  0.211893354  0.016212450
## radius_worst       -0.22800935  0.219296044 -0.049406340  0.015659705
## texture_worst      -0.10451545  0.045501223 -0.039828934 -0.633119655
## perimeter_worst    -0.23663734  0.199295985 -0.050431945  0.014068572
## area_worst         -0.22493214  0.218985461 -0.013188891  0.025970672
## smoothness_worst   -0.12782441 -0.172562959 -0.255328751  0.014523359
## compactness_worst  -0.20988456 -0.144253637 -0.234513609 -0.092562168
## concavity_worst    -0.22860218 -0.098526524 -0.172024941 -0.074807188
## points_worst       -0.25074620  0.007534367 -0.170480673  0.005305980
## symmetry_worst     -0.12267993 -0.142619436 -0.270515902 -0.037129466
## dimension_worst    -0.13156024 -0.275702077 -0.229474476 -0.078971489
##                             PC5           PC6           PC7           PC8
## id                  0.011327587 -0.316733438  0.9071156324 -0.096362415
## radius_mean        -0.038129861  0.029588521 -0.0422987777 -0.116427419
## texture_mean        0.049091450 -0.031394323  0.0149935618  0.001875482
## perimeter_mean     -0.037715592  0.028394008 -0.0435888242 -0.106272097
## area_mean          -0.010562229  0.006113155 -0.0289256668 -0.047414568
## smoothness_mean     0.365750055 -0.262508993 -0.1403403617 -0.123541189
## compactness_mean   -0.011786637 -0.004903894 -0.0453031106  0.043145968
## concavity_mean     -0.086512506 -0.002356338 -0.0325530646 -0.102436021
## points_mean         0.043667412 -0.034509273 -0.0814216298 -0.136923237
## symmetry_mean       0.305378893  0.335082168  0.1182592361 -0.098874531
```

```
## dimension_mean     0.044767906 -0.112784169 -0.0410588768  0.306499872
## radius_se          0.154254367 -0.023261199  0.0167882718  0.307415709
## texture_se         0.190001500  0.022856912 -0.1902676469 -0.052632477
## perimeter_se       0.120703357  0.003820151  0.0195081762  0.311265679
## area_se            0.127765023 -0.051958835  0.0565606078  0.334287959
## smoothness_se      0.232745603 -0.330867850 -0.0678348099 -0.260833914
## compactness_se    -0.280298048  0.066788120  0.0222220211  0.021001944
## concavity_se      -0.354164595  0.049699104  0.0336810725 -0.219193299
## points_se         -0.195758558 -0.023197526 -0.0378517870 -0.370217167
## symmetry_se        0.251331178  0.477530515  0.1184032606 -0.084854768
## dimension_se      -0.263395188 -0.048462373 -0.0157602244  0.194418818
## radius_worst       0.004280034  0.004521737 -0.0166458140 -0.007508307
## texture_worst      0.092551860 -0.045174516 -0.0094601240  0.006617640
## perimeter_worst   -0.007599144  0.012921166 -0.0145260986  0.002162488
## area_worst         0.027413595 -0.024033338 -0.0007372602  0.066173186
## smoothness_worst   0.325860028 -0.365048687 -0.0670682168 -0.116496117
## compactness_worst -0.121503371  0.034042714  0.0507556727  0.136509363
## concavity_worst   -0.188280510  0.017962040  0.0352007117 -0.067085744
## points_worst      -0.043123573 -0.029549100 -0.0207238959 -0.166500918
## symmetry_worst     0.244245936  0.451404312  0.2340143294 -0.041439633
## dimension_worst   -0.093699078 -0.092479698  0.0347167538  0.372034479
##                           PC9        PC10         PC11         PC12
## id                 0.149115642 -0.16926751  0.058188997 -0.006721252
## radius_mean       -0.046270835 -0.22402704 -0.079466081 -0.042213788
## texture_mean      -0.088727168  0.11945674 -0.253258091  0.304032359
## perimeter_mean    -0.036230738 -0.22634517 -0.069865929 -0.017573055
## area_mean         -0.080649856 -0.18600385 -0.062795372 -0.110760120
## smoothness_mean    0.278996404 -0.06133822  0.084661549  0.135321954
## compactness_mean   0.099214048 -0.19518602  0.005172841  0.307036205
## concavity_mean     0.075750464  0.03395563  0.134664686 -0.124553100
## points_mean        0.116569072 -0.14261678  0.006124860  0.071564686
## symmetry_mean      0.315150303  0.13561452 -0.574417320 -0.161058144
## dimension_mean     0.130639482 -0.15848117 -0.066456112  0.037318709
## radius_se          0.026200456  0.26504403  0.025847282  0.027030250
## texture_se         0.372989606 -0.31521084  0.323158815 -0.348396233
## perimeter_se       0.052860114  0.23789288  0.094867442  0.168501485
## area_se           -0.030627892  0.24966405  0.071991560 -0.050731496
## smoothness_se     -0.580789293 -0.01015980 -0.179568831 -0.081753374
## compactness_se    -0.148593714 -0.11518343 -0.038615749  0.206959272
## concavity_se       0.034715098  0.36592141  0.113536362 -0.348342358
## points_se          0.189022962  0.21518752 -0.094066850  0.342855186
## symmetry_se       -0.292785738 -0.22049558  0.328314881  0.185998712
## dimension_se      -0.060203202 -0.22637997 -0.353844543 -0.250428852
## radius_worst      -0.070224590 -0.09981025 -0.073013014 -0.105030701
## texture_worst     -0.008571809  0.10669296 -0.038561250 -0.012490348
## perimeter_worst   -0.058854223 -0.09821693 -0.045750979 -0.051125158
## area_worst        -0.097034650 -0.06179787 -0.068822329 -0.184460981
## smoothness_worst  -0.173257498  0.16912753  0.109278029 -0.142996001
## compactness_worst -0.111218083 -0.06445290  0.175401648  0.196805544
## concavity_worst   -0.035467377  0.19661986  0.295581609 -0.184959562
## points_worst       0.052322473  0.05121611  0.075496752  0.117518361
## symmetry_worst    -0.188266324  0.10308901  0.019223451 -0.157210098
## dimension_worst   -0.087222442 -0.11291399 -0.007071634 -0.118625115
##                          PC13         PC14         PC15         PC16
## id                -0.004841084 -0.006500099  0.006885943 -0.002753492
## radius_mean        0.050603927 -0.012496988 -0.059054553  0.050789156
## texture_mean       0.256273666 -0.201876125  0.020701124  0.108089530
## perimeter_mean     0.038470392 -0.044684430 -0.048019221  0.039590476
## area_mean          0.065047550 -0.067879244 -0.010152279 -0.014636050
## smoothness_mean    0.315872261 -0.046461624 -0.444044654  0.117493291
## compactness_mean  -0.104264618 -0.230005458 -0.007661166 -0.230759682
## concavity_mean     0.065723393 -0.387349680  0.189733740  0.128386008
## points_mean        0.042253113 -0.132637847  0.245219266  0.217299938
## symmetry_mean     -0.288054252 -0.189570545 -0.030903840  0.073950596
## dimension_mean     0.236120382 -0.106390748  0.377436108 -0.518333769
## radius_se         -0.015625578  0.069635807 -0.011959877  0.111103952
## texture_se        -0.308499115  0.165408488  0.012614192 -0.033389049
## perimeter_se      -0.100597125  0.038865462  0.044358477  0.008991734
## area_se           -0.017226446 -0.055687709 -0.083203050  0.045171638
## smoothness_se     -0.293287983 -0.149148603  0.200139961 -0.018414232
## compactness_se    -0.263398426 -0.010320713 -0.491903153 -0.167886977
## concavity_se       0.251864823 -0.157777595 -0.135322845 -0.250292522
## points_se         -0.006430584  0.494527095  0.199547389 -0.062548716
```

```
## points_se          -0.000430584  0.494527095  0.199547389 -0.062548716
## symmetry_se         0.319874237 -0.010836031  0.047340593  0.113219397
## dimension_se        0.275943072  0.240767973 -0.145958050  0.353782637
## radius_worst        0.039582217  0.138036550 -0.023526025 -0.166213790
## texture_worst       0.080142089  0.080737140 -0.053897961 -0.100862417
## perimeter_worst    -0.009084762  0.097004376 -0.012559001 -0.182407021
## area_worst          0.047986766  0.101235629  0.006646192 -0.315142865
## smoothness_worst    0.056931408  0.206026671 -0.163389545 -0.045226715
## compactness_worst -0.371991007 -0.013117334 -0.165941776  0.049613607
## concavity_worst    -0.086870368 -0.218055908  0.066854662  0.204743734
## points_worst       -0.068367254  0.254345228  0.276401728  0.169597618
## symmetry_worst      0.043937722  0.256766084 -0.005448734 -0.139913723
## dimension_worst    -0.035134642  0.172524501  0.212520491  0.255448214
##                           PC17         PC18         PC19         PC20
## id                 -0.007779983 -0.019707372  0.005442248  0.020454908
## radius_mean         0.150008977  0.209908003 -0.156773206  0.211821385
## texture_mean        0.159152972 -0.034161758  0.040048687  0.029931705
## perimeter_mean      0.113792993  0.201233658 -0.168413120  0.227079273
## area_mean           0.130173978  0.251460456 -0.269145594 -0.045499625
## smoothness_mean     0.203117911  0.168171613  0.354463321 -0.160358262
## compactness_mean   -0.170379447 -0.016302860 -0.014259132  0.292092522
## concavity_mean     -0.270010606 -0.005071590  0.027973937  0.007197446
## points_mean        -0.381111880  0.028741889  0.087065594 -0.153991624
## symmetry_mean       0.165691481 -0.194702559 -0.169168737 -0.058503329
## dimension_mean      0.039119713  0.046298986 -0.086779501 -0.062879947
## radius_se          -0.055118880 -0.124562479  0.231233991  0.181436577
## texture_se          0.032768777  0.041652813  0.009177450  0.038681291
## perimeter_se       -0.023929011 -0.009084130  0.014508488  0.364045783
## area_se            -0.045538238  0.313148246 -0.296273515 -0.433949999
## smoothness_se       0.058326686  0.145306166  0.228819703 -0.013932678
## compactness_se     -0.190065826 -0.015610691 -0.094108380 -0.250216687
## concavity_se        0.126034946  0.092345618 -0.005794297  0.119490304
## points_se           0.197671940  0.106747906 -0.046944796 -0.015851066
## symmetry_se         0.158541381 -0.279918359 -0.180195394 -0.084242460
## dimension_se       -0.267180143 -0.122002438  0.059970839  0.097082660
## radius_worst        0.083459877 -0.235215809  0.218781792  0.027741137
## texture_worst      -0.185972310  0.065992656 -0.057250572 -0.080880841
## perimeter_worst     0.056649279 -0.228493742  0.189279122  0.105666112
## area_worst          0.090325036 -0.286471546  0.158722686 -0.393681440
## smoothness_worst   -0.142781922 -0.276751162 -0.504565504  0.228506719
## compactness_worst   0.153347954 -0.003683424  0.073627229  0.025544372
## concavity_worst     0.216302398 -0.190307542  0.107894455 -0.035839305
## points_worst       -0.178353485 -0.085180057 -0.067182996 -0.261323873
## symmetry_worst     -0.260033510  0.436706158  0.269313654  0.111738683
## dimension_worst     0.404957673  0.162920272 -0.026674889 -0.022516600
##                           PC21         PC22         PC23         PC24
## id                  0.009870917  0.006195707  0.003190337 -0.010289027
## radius_mean         0.046009507  0.070394387 -0.073021974 -0.098704322
## texture_mean        0.264801220 -0.436269565 -0.095890704  0.001311285
## perimeter_mean      0.015122205  0.070963404 -0.074821704 -0.040500943
## area_mean           0.087345298  0.021672998 -0.097428804  0.009396470
## smoothness_mean    -0.023842011  0.117945821 -0.063741313 -0.020088204
## compactness_mean   -0.476395571 -0.213187888  0.094254664  0.058295270
## concavity_mean      0.037771062 -0.001270114  0.188862925  0.321062737
## points_mean         0.231546040  0.017493297  0.313280824 -0.057974684
## symmetry_mean      -0.030776761  0.085067786  0.018331111 -0.052004767
## dimension_mean      0.172565576  0.085104005 -0.286892578 -0.084701081
## radius_se           0.090564458 -0.085660592  0.147793165 -0.263799753
## texture_se          0.083589382 -0.212168357 -0.048761201 -0.001150858
## perimeter_se        0.169586632  0.317246026 -0.153859020  0.081384223
## area_se            -0.270679518 -0.207916141 -0.068745790  0.110258620
## smoothness_se      -0.095370809  0.066602974 -0.051852247 -0.057154068
## compactness_se      0.451033960  0.159332265  0.048970757  0.003993806
## concavity_se       -0.070203251 -0.071023842  0.200850815 -0.388573085
## points_se          -0.064848884 -0.035557778  0.074494143  0.354040783
## symmetry_se        -0.112133933  0.092193625  0.084324570 -0.043455477
## dimension_se       -0.214213177 -0.069171668 -0.245408452  0.089594196
## radius_worst        0.006481267 -0.007068180  0.096292694 -0.057768458
## texture_worst      -0.330244412  0.578095532  0.111968438 -0.009473435
## perimeter_worst    -0.010544107  0.094457678 -0.014952244  0.058698441
## area_worst         -0.053510824 -0.149328216  0.096798702  0.193293235
## smoothness_worst    0.140127867 -0.156936236  0.069660581  0.091134610
## compactness_worst -0.220884131 -0.191897773 -0.033373706 -0.145389941
```

```
## concavity_worst    0.047166544  0.139729448 -0.456817799  0.290302924
## points_worst      -0.039740929 -0.006870640 -0.305694162 -0.563297713
## symmetry_worst     0.125617213 -0.155827542 -0.096426675  0.122996111
## dimension_worst    0.095366679  0.092769737  0.470358007  0.002775112
##                         PC25         PC26         PC27         PC28
## id                -0.004233388 -0.00132610 -0.002571324 -0.001623875
## radius_mean       -0.183664583  0.01859418  0.128713229  0.131697326
## texture_mean       0.099441545 -0.08442059  0.024821224  0.017622634
## perimeter_mean    -0.117262178 -0.02743488  0.124670225  0.115650274
## area_mean          0.070557041  0.21057100 -0.361014547 -0.467489167
## smoothness_mean    0.068940049 -0.02876100  0.037372832 -0.069482805
## compactness_mean  -0.102198309 -0.39651346 -0.262695425 -0.098624638
## concavity_mean     0.045550527  0.09717977  0.550227716 -0.363040016
## points_mean        0.082349955  0.18630114 -0.389316679  0.453345398
## symmetry_mean      0.018841491  0.02451053  0.015910368  0.015157593
## dimension_mean    -0.134601525  0.20670502  0.096796804  0.101343150
## radius_se         -0.561133900  0.17339784 -0.050411953 -0.213735821
## texture_se         0.023938591 -0.05709165  0.010893175  0.009925699
## perimeter_se       0.516048248 -0.07217201 -0.103485879 -0.041989200
## area_se           -0.018546693 -0.13093723  0.155929011  0.314758068
## smoothness_se      0.016193934 -0.03100551  0.008066566  0.009312365
## compactness_se    -0.122457873 -0.17364984  0.049404535 -0.046651501
## concavity_se       0.186159613 -0.01600952 -0.091931364  0.083824645
## points_se         -0.107166573  0.12999049  0.018674110  0.011675700
## symmetry_se        0.002613811  0.01936313  0.016991197  0.019891112
## dimension_se       0.076177800  0.08458109 -0.035156906  0.012141785
## radius_worst      -0.158114412 -0.07144112  0.195812320  0.178796461
## texture_worst     -0.118609952  0.11802219 -0.036347107 -0.021473842
## perimeter_worst    0.236463109 -0.11790535  0.243266456  0.241658719
## area_worst         0.146339946  0.03921251 -0.229813188 -0.237323945
## smoothness_worst  -0.011224935  0.04787154 -0.012860335  0.040730207
## compactness_worst  0.185437121  0.62471727  0.100772153  0.071087434
## concavity_worst   -0.286701322 -0.11586768 -0.267236886  0.142148446
## points_worst       0.105286798 -0.26352782  0.133749940 -0.230794105
## symmetry_worst    -0.013193455 -0.04505357 -0.027824916 -0.022695808
## dimension_worst    0.037882167 -0.28015574 -0.004500884 -0.060081371
##                           PC29          PC30          PC31
## id                -1.891724e-05 -0.0006852263 -7.122581e-05
## radius_mean        2.111968e-01 -0.2114371011 -7.024325e-01
## texture_mean      -6.362507e-05  0.0106165839 -2.644366e-04
## perimeter_mean     8.434280e-02 -0.3838889617  6.898676e-01
## area_mean         -2.725167e-01  0.4227208085  3.297173e-02
## smoothness_mean    1.480038e-03  0.0034638648  4.850746e-03
## compactness_mean  -5.466656e-03  0.0409079834 -4.468229e-02
## concavity_mean     4.554138e-02  0.0101122808 -2.512860e-02
## points_mean       -8.885707e-03  0.0041142627  1.067984e-03
## symmetry_mean      1.432581e-03  0.0075571475  1.279594e-03
## dimension_mean    -6.312291e-03 -0.0073311823  4.751885e-03
## radius_se         -1.922290e-01 -0.1186768422  8.679321e-03
## texture_se        -5.624974e-03  0.0086942153  1.063104e-03
## perimeter_se       2.631905e-01  0.0060612569 -1.373310e-02
## area_se           -4.205668e-02  0.0863645419 -1.054698e-03
## smoothness_se      9.795835e-03 -0.0016737982  1.618711e-03
## compactness_se    -1.539757e-02 -0.0032295613 -1.923037e-03
## concavity_se       5.819985e-03 -0.0161202167  8.921294e-03
## points_se         -2.900497e-02  0.0241014722  2.178643e-03
## symmetry_se       -7.637856e-03  0.0051771158 -3.338380e-04
## dimension_se       1.975791e-02  0.0083971145 -1.792802e-03
## radius_worst       4.126296e-01  0.6356796555  1.356846e-01
## texture_worst     -3.896988e-04 -0.0172219636 -1.020237e-03
## perimeter_worst   -7.286790e-01 -0.0228830657 -7.974244e-02
## area_worst         2.389679e-01 -0.4448733182 -3.976788e-02
## smoothness_worst  -1.535941e-03 -0.0074142082 -4.586820e-03
## compactness_worst  4.869512e-02  0.0001075081  1.285262e-02
## concavity_worst   -1.764174e-02  0.0126547542 -4.031809e-04
## points_worst       2.247340e-02 -0.0353341030  2.276561e-03
## symmetry_worst     4.922100e-03 -0.0133523613 -3.910451e-04
## dimension_worst   -2.356283e-02 -0.0115053741 -1.897779e-03
```

```
print(cancer_pca)
```

```
## Standard deviations (1,      p=31):
```

```
## Standard deviations (1, ..., p=31):
##  [1] 3.64527878 2.38679814 1.68386313 1.40760690 1.28406203 1.11115827
##  [7] 0.98907696 0.81960537 0.67881693 0.63492763 0.59089337 0.54211662
## [13] 0.51102537 0.49125372 0.39619900 0.30680373 0.28250655 0.24299439
## [19] 0.22932770 0.22163467 0.17626907 0.17303527 0.16562163 0.15572098
## [25] 0.13431069 0.12441756 0.09039745 0.08305482 0.03986650 0.02735646
## [31] 0.01153431
##
## Rotation (n x k) = (31 x 31):
##                             PC1          PC2          PC3          PC4
## id                  -0.02291216  0.034068491  0.096938436 -0.026598045
## radius_mean         -0.21891302  0.233271401 -0.011393786  0.042187950
## texture_mean        -0.10384388  0.060044199  0.066892342 -0.602954308
## perimeter_mean      -0.22753491  0.214589002 -0.012124791  0.042752797
## area_mean           -0.22104577  0.230668816  0.026293150  0.054114724
## smoothness_mean     -0.14241471 -0.186422211 -0.103182400  0.158098177
## compactness_mean    -0.23906730 -0.152454726 -0.074768623  0.031818117
## concavity_mean      -0.25828025 -0.060541625  0.001758736  0.019497124
## points_mean         -0.26073811  0.034167392 -0.027579607  0.065785353
## symmetry_mean       -0.13797774 -0.190684979 -0.040962032  0.067502543
## dimension_mean      -0.06414779 -0.366531055 -0.020817875  0.047957856
## radius_se           -0.20611747  0.105935702  0.266917221  0.099114446
## texture_se          -0.01741339 -0.089547789  0.371439885 -0.356497230
## perimeter_se        -0.21144652  0.089807043  0.264925682  0.090293055
## area_se             -0.20307642  0.152771289  0.215790250  0.108568705
## smoothness_se       -0.01467821 -0.203189876  0.311787845  0.044368664
## compactness_se      -0.17028840 -0.232503362  0.154557465 -0.026425360
## concavity_se        -0.15354367 -0.196846081  0.176560052  0.002248291
## points_se           -0.18340675 -0.129965181  0.223850479  0.075252232
## symmetry_se         -0.04241552 -0.183558627  0.285265066  0.046936126
## dimension_se        -0.10249607 -0.279584139  0.211893354  0.016212450
## radius_worst        -0.22800935  0.219296044 -0.049406340  0.015659705
## texture_worst       -0.10451545  0.045501223 -0.039828934 -0.633119655
## perimeter_worst     -0.23663734  0.199295985 -0.050431945  0.014068572
## area_worst          -0.22493214  0.218985461 -0.013188891  0.025970672
## smoothness_worst    -0.12782441 -0.172562959 -0.255328751  0.014523359
## compactness_worst   -0.20988456 -0.144253637 -0.234513609 -0.092562168
## concavity_worst     -0.22860218 -0.098526524 -0.172024941 -0.074807188
## points_worst        -0.25074620  0.007534367 -0.170480673  0.005305980
## symmetry_worst      -0.12267993 -0.142619436 -0.270515902 -0.037129466
## dimension_worst     -0.13156024 -0.275702077 -0.229474476 -0.078971489
##                             PC5          PC6           PC7          PC8
## id                   0.011327587 -0.316733438  0.9071156324 -0.096362415
## radius_mean         -0.038129861  0.029588521 -0.0422987777 -0.116427419
## texture_mean         0.049091450 -0.031394323  0.0149935618  0.001875482
## perimeter_mean      -0.037715592  0.028394008 -0.0435888242 -0.106272097
## area_mean           -0.010562229  0.006113155 -0.0289256668 -0.047414568
## smoothness_mean      0.365750055 -0.262508993 -0.1403403617 -0.123541189
## compactness_mean    -0.011786637 -0.004903894 -0.0453031106  0.043145968
## concavity_mean      -0.086512506 -0.002356338 -0.0325530646 -0.102436021
## points_mean          0.043667412 -0.034509273 -0.0814216298 -0.136923237
## symmetry_mean        0.305378893  0.335082168  0.1182592361 -0.098874531
## dimension_mean       0.044767906 -0.112784169 -0.0410588768  0.306499872
## radius_se            0.154254367 -0.023261199  0.0167882718  0.307415709
## texture_se           0.190001500  0.022856912 -0.1902676469 -0.052632477
## perimeter_se         0.120703357  0.003820151  0.0195081762  0.311265679
## area_se              0.127765023 -0.051958835  0.0565606078  0.334287959
## smoothness_se        0.232745603 -0.330867850 -0.0678348099 -0.260833914
## compactness_se      -0.280298048  0.066788120  0.0222220211  0.021001944
## concavity_se        -0.354164595  0.049699104  0.0336810725 -0.219193299
## points_se           -0.195758558 -0.023197526 -0.0378517870 -0.370217167
## symmetry_se          0.251331178  0.477530515  0.1184032606 -0.084854768
## dimension_se        -0.263395188 -0.048462373 -0.0157602244  0.194418818
## radius_worst         0.004280034  0.004521737 -0.0166458140 -0.007508307
## texture_worst        0.092551860 -0.045174516 -0.0094601240  0.006617640
## perimeter_worst     -0.007599144  0.012921166 -0.0145260986  0.002162488
## area_worst           0.027413595 -0.024033338 -0.0007372602  0.066173186
## smoothness_worst     0.325860028 -0.365048687 -0.0670682168 -0.116496117
## compactness_worst   -0.121503371  0.034042714  0.0507556727  0.136509363
## concavity_worst     -0.188280510  0.017962040  0.0352007117 -0.067085744
## points_worst        -0.043123573 -0.029549100 -0.0207238959 -0.166500918
## symmetry_worst       0.244245936  0.451404312  0.2340143294 -0.041439633
## dimension_worst     -0.093699078 -0.092479698  0.0347167538  0.372034479
```

```
##                             PC9         PC10          PC11          PC12
## id                   0.149115642 -0.16926751  0.058188997 -0.006721252
## radius_mean         -0.046270835 -0.22402704 -0.079466081 -0.042213788
## texture_mean        -0.088727168  0.11945674 -0.253258091  0.304032359
## perimeter_mean      -0.036230738 -0.22634517 -0.069865929 -0.017573055
## area_mean           -0.080649856 -0.18600385 -0.062795372 -0.110760120
## smoothness_mean      0.278996404 -0.06133822  0.084661549  0.135321954
## compactness_mean     0.099214048 -0.19518602  0.005172841  0.307036205
## concavity_mean       0.075750464  0.03395563  0.134664686 -0.124553100
## points_mean          0.116569072 -0.14261678  0.006124860  0.071564686
## symmetry_mean        0.315150303  0.13561452 -0.574417320 -0.161058144
## dimension_mean       0.130639482 -0.15848117 -0.066456112  0.037318709
## radius_se            0.026200456  0.26504403  0.025847282  0.027030250
## texture_se           0.372989606 -0.31521084  0.323158815 -0.348396233
## perimeter_se         0.052860114  0.23789288  0.094867442  0.168501485
## area_se             -0.030627892  0.24966405  0.071991560 -0.050731496
## smoothness_se       -0.580789293 -0.01015980 -0.179568831 -0.081753374
## compactness_se      -0.148593714 -0.11518343 -0.038615749  0.206959272
## concavity_se         0.034715098  0.36592141  0.113536362 -0.348342358
## points_se            0.189022962  0.21518752 -0.094066850  0.342855186
## symmetry_se         -0.292785738 -0.22049558  0.328314881  0.185998712
## dimension_se        -0.060203202 -0.22637997 -0.353844543 -0.250428852
## radius_worst        -0.070224590 -0.09981025 -0.073013014 -0.105030701
## texture_worst       -0.008571809  0.10669296 -0.038561250 -0.012490348
## perimeter_worst     -0.058854223 -0.09821693 -0.045750979 -0.051125158
## area_worst          -0.097034650 -0.06179787 -0.068822329 -0.184460981
## smoothness_worst    -0.173257498  0.16912753  0.109278029 -0.142996001
## compactness_worst   -0.111218083 -0.06445290  0.175401648  0.196805544
## concavity_worst     -0.035467377  0.19661986  0.295581609 -0.184959562
## points_worst         0.052322473  0.05121611  0.075496752  0.117518361
## symmetry_worst      -0.188266324  0.10308901  0.019223451 -0.157210098
## dimension_worst     -0.087222442 -0.11291399 -0.007071634 -0.118625115
##                            PC13         PC14          PC15          PC16
## id                  -0.004841084 -0.006500099  0.006885943 -0.002753492
## radius_mean          0.050603927 -0.012496988 -0.059054553  0.050789156
## texture_mean         0.256273666 -0.201876125  0.020701124  0.108089530
## perimeter_mean       0.038470392 -0.044684430 -0.048019221  0.039590476
## area_mean            0.065047550 -0.067879244 -0.010152279 -0.014636050
## smoothness_mean      0.315872261 -0.046461624 -0.444044654  0.117493291
## compactness_mean    -0.104264618 -0.230005458 -0.007661166 -0.230759682
## concavity_mean       0.065723393 -0.387349680  0.189733740  0.128386008
## points_mean          0.042253113 -0.132637847  0.245219266  0.217299938
## symmetry_mean       -0.288054252 -0.189570545 -0.030903840  0.073950596
## dimension_mean       0.236120382 -0.106390748  0.377436108 -0.518333769
## radius_se           -0.015625578  0.069635807 -0.011959877  0.111103952
## texture_se          -0.308499115  0.165408488  0.012614192 -0.033389049
## perimeter_se        -0.100597125  0.038865462  0.044358477  0.008991734
## area_se             -0.017226446 -0.055687709 -0.083203050  0.045171638
## smoothness_se       -0.293287983 -0.149148603  0.200139961 -0.018414232
## compactness_se      -0.263398426 -0.010320713 -0.491903153 -0.167886977
## concavity_se         0.251864823 -0.157777595 -0.135322845 -0.250292522
## points_se           -0.006430584  0.494527095  0.199547389 -0.062548716
## symmetry_se          0.319874237 -0.010836031  0.047340593  0.113219397
## dimension_se         0.275943072  0.240767973 -0.145958050  0.353782637
## radius_worst         0.039582217  0.138036550 -0.023526025 -0.166213790
## texture_worst        0.080142089  0.080737140 -0.053897961 -0.100862417
## perimeter_worst     -0.009084762  0.097004376 -0.012559001 -0.182407021
## area_worst           0.047986766  0.101235629  0.006646192 -0.315142865
## smoothness_worst     0.056931408  0.206026671 -0.163389545 -0.045226715
## compactness_worst   -0.371991007 -0.013117334 -0.165941776  0.049613607
## concavity_worst     -0.086870368 -0.218055908  0.066854662  0.204743734
## points_worst        -0.068367254  0.254345228  0.276401728  0.169597618
## symmetry_worst       0.043937722  0.256766084 -0.005448734 -0.139913723
## dimension_worst     -0.035134642  0.172524501  0.212520491  0.255448214
##                            PC17         PC18          PC19          PC20
## id                  -0.007779983 -0.019707372  0.005442248  0.020454908
## radius_mean          0.150008977  0.209908003 -0.156773206  0.211821385
## texture_mean         0.159152972 -0.034161758  0.040048687  0.029931705
## perimeter_mean       0.113792993  0.201233658 -0.168413120  0.227079273
## area_mean            0.130173978  0.251460456 -0.269145594 -0.045499625
## smoothness_mean      0.203117911  0.168171613  0.354463321 -0.160358262
## compactness_mean    -0.170379447 -0.016302860 -0.014259132  0.292092522
## concavity_mean      -0.270010606 -0.005071590  0.027973937  0.007197446
```

```
##                          -_
## points_mean        -0.381111880  0.028741889  0.087065594 -0.153991624
## symmetry_mean       0.165691481 -0.194702559 -0.169168737 -0.058503329
## dimension_mean      0.039119713  0.046298986 -0.086779501 -0.062879947
## radius_se          -0.055118880 -0.124562479  0.231233991  0.181436577
## texture_se          0.032768777  0.041652813  0.009177450  0.038681291
## perimeter_se       -0.023929011 -0.009084130  0.014508488  0.364045783
## area_se            -0.045538238  0.313148246 -0.296273515 -0.433949999
## smoothness_se       0.058326686  0.145306166  0.228819703 -0.013932678
## compactness_se     -0.190065826 -0.015610691 -0.094108380 -0.250216687
## concavity_se        0.126034946  0.092345618 -0.005794297  0.119490304
## points_se           0.197671940  0.106747906 -0.046944796 -0.015851066
## symmetry_se         0.158541381 -0.279918359 -0.180195394 -0.084242460
## dimension_se       -0.267180143 -0.122002438  0.059970839  0.097082660
## radius_worst        0.083459877 -0.235215809  0.218781792  0.027741137
## texture_worst      -0.185972310  0.065992656 -0.057250572 -0.080880841
## perimeter_worst     0.056649279 -0.228493742  0.189279122  0.105666112
## area_worst          0.090325036 -0.286471546  0.158722686 -0.393681440
## smoothness_worst   -0.142781922 -0.276751162 -0.504565504  0.228506719
## compactness_worst   0.153347954 -0.003683424  0.073627229  0.025544372
## concavity_worst     0.216302398 -0.190307542  0.107894455 -0.035839305
## points_worst       -0.178353485 -0.085180057 -0.067182996 -0.261323873
## symmetry_worst     -0.260033510  0.436706158  0.269313654  0.111738683
## dimension_worst     0.404957673  0.162920272 -0.026674889 -0.022516600
##                           PC21         PC22         PC23         PC24
## id                  0.009870917  0.006195707  0.003190337 -0.010289027
## radius_mean         0.046009507  0.070394387 -0.073021974 -0.098704322
## texture_mean        0.264801220 -0.436269565 -0.095890704  0.001311285
## perimeter_mean      0.015122205  0.070963404 -0.074821704 -0.040500943
## area_mean           0.087345298  0.021672998 -0.097428804  0.009396470
## smoothness_mean    -0.023842011  0.117945821 -0.063741313 -0.020088204
## compactness_mean   -0.476395571 -0.213187888  0.094254664  0.058295270
## concavity_mean      0.037771062 -0.001270114  0.188862925  0.321062737
## points_mean         0.231546040  0.017493297  0.313280824 -0.057974684
## symmetry_mean      -0.030776761  0.085067786  0.018331111 -0.052004767
## dimension_mean      0.172565576  0.085104005 -0.286892578 -0.084701081
## radius_se           0.090564458 -0.085660592  0.147793165 -0.263799753
## texture_se          0.083589382 -0.212168357 -0.048761201 -0.001150858
## perimeter_se        0.169586632  0.317246026 -0.153859020  0.081384223
## area_se            -0.270679518 -0.207916141 -0.068745790  0.110258620
## smoothness_se      -0.095370809  0.066602974 -0.051852247 -0.057154068
## compactness_se      0.451033960  0.159332265  0.048970757  0.003993806
## concavity_se       -0.070203251 -0.071023842  0.200850815 -0.388573085
## points_se          -0.064848884 -0.035557778  0.074494143  0.354040783
## symmetry_se        -0.112133933  0.092193625  0.084324570 -0.043455477
## dimension_se       -0.214213177 -0.069171668 -0.245408452  0.089594196
## radius_worst        0.006481267 -0.007068180  0.096292694 -0.057768458
## texture_worst      -0.330244412  0.578095532  0.111968438 -0.009473435
## perimeter_worst    -0.010544107  0.094457678 -0.014952244  0.058698441
## area_worst         -0.053510824 -0.149328216  0.096798702  0.193293235
## smoothness_worst    0.140127867 -0.156936236  0.069660581  0.091134610
## compactness_worst  -0.220884131 -0.191897773 -0.033373706 -0.145389941
## concavity_worst     0.047166544  0.139729448 -0.456817799  0.290302924
## points_worst       -0.039740929 -0.006870640 -0.305694162 -0.563297713
## symmetry_worst      0.125617213 -0.155827542 -0.096426675  0.122996111
## dimension_worst     0.095366679  0.092769737  0.470358007  0.002775112
##                           PC25         PC26         PC27         PC28
## id                 -0.004233388 -0.00132610 -0.002571324 -0.001623875
## radius_mean        -0.183664583  0.01859418  0.128713229  0.131697326
## texture_mean        0.099441545 -0.08442059  0.024821224  0.017622634
## perimeter_mean     -0.117262178 -0.02743488  0.124670225  0.115650274
## area_mean           0.070557041  0.21057100 -0.361014547 -0.467489167
## smoothness_mean     0.068940049 -0.02876100  0.037372832 -0.069482805
## compactness_mean   -0.102198309 -0.39651346 -0.262695425 -0.098624638
## concavity_mean      0.045550527  0.09717977  0.550227716 -0.363040016
## points_mean         0.082349955  0.18630114 -0.389316679  0.453345398
## symmetry_mean       0.018841491  0.02451053  0.015910368  0.015157593
## dimension_mean     -0.134601525  0.20670502  0.096796804  0.101343150
## radius_se          -0.561133900  0.17339784 -0.050411953 -0.213735821
## texture_se          0.023938591 -0.05709165  0.010893175  0.009925699
## perimeter_se        0.516048248 -0.07217201 -0.103485879 -0.041989200
## area_se            -0.018546693 -0.13093723  0.155929011  0.314758068
## smoothness_se       0.016193934 -0.03100551  0.008066566  0.009312365
## compactness_se     -0.122457873 -0.17364984  0.049404535 -0.046651501
```

```
## compactness_se    -0.122457875 -0.17564984  0.049404535 -0.046651501
## concavity_se       0.186159613 -0.01600952 -0.091931364  0.083824645
## points_se         -0.107166573  0.12999049  0.018674110  0.011675700
## symmetry_se        0.002613811  0.01936313  0.016991197  0.019891112
## dimension_se       0.076177800  0.08458109 -0.035156906  0.012141785
## radius_worst      -0.158114412 -0.07144112  0.195812320  0.178796461
## texture_worst     -0.118609952  0.11802219 -0.036347107 -0.021473842
## perimeter_worst    0.236463109 -0.11790535  0.243266456  0.241658719
## area_worst         0.146339946  0.03921251 -0.229813188 -0.237323945
## smoothness_worst  -0.011224935  0.04787154 -0.012860335  0.040730207
## compactness_worst  0.185437121  0.62471727  0.100772153  0.071087434
## concavity_worst   -0.286701322 -0.11586768 -0.267236886  0.142148446
## points_worst       0.105286798 -0.26352782  0.133749940 -0.230794105
## symmetry_worst    -0.013193455 -0.04505357 -0.027824916 -0.022695808
## dimension_worst    0.037882167 -0.28015574 -0.004500884 -0.060081371
##                           PC29          PC30          PC31
## id                -1.891724e-05 -0.0006852263 -7.122581e-05
## radius_mean        2.111968e-01 -0.2114371011 -7.024325e-01
## texture_mean      -6.362507e-05  0.0106165839 -2.644366e-04
## perimeter_mean     8.434280e-02 -0.3838889617  6.898676e-01
## area_mean         -2.725167e-01  0.4227208085  3.297173e-02
## smoothness_mean    1.480038e-03  0.0034638648  4.850746e-03
## compactness_mean  -5.466656e-03  0.0409079834 -4.468229e-02
## concavity_mean     4.554138e-02  0.0101122808 -2.512860e-02
## points_mean       -8.885707e-03  0.0041142627  1.067984e-03
## symmetry_mean      1.432581e-03  0.0075571475  1.279594e-03
## dimension_mean    -6.312291e-03 -0.0073311823  4.751885e-03
## radius_se         -1.922290e-01 -0.1186768422  8.679321e-03
## texture_se        -5.624974e-03  0.0086942153  1.063104e-03
## perimeter_se       2.631905e-01  0.0060612569 -1.373310e-02
## area_se           -4.205668e-02  0.0863645419 -1.054698e-03
## smoothness_se      9.795835e-03 -0.0016737982  1.618711e-03
## compactness_se    -1.539757e-02 -0.0032295613 -1.923037e-03
## concavity_se       5.819985e-03 -0.0161202167  8.921294e-03
## points_se         -2.900497e-02  0.0241014722  2.178643e-03
## symmetry_se       -7.637856e-03  0.0051771158 -3.338380e-04
## dimension_se       1.975791e-02  0.0083971145 -1.792802e-03
## radius_worst       4.126296e-01  0.6356796555  1.356846e-01
## texture_worst     -3.896988e-04 -0.0172219636 -1.020237e-03
## perimeter_worst   -7.286790e-01 -0.0228830657 -7.974244e-02
## area_worst         2.389679e-01 -0.4448733182 -3.976788e-02
## smoothness_worst  -1.535941e-03 -0.0074142082 -4.586820e-03
## compactness_worst  4.869512e-02  0.0001075081  1.285262e-02
## concavity_worst   -1.764174e-02  0.0126547542 -4.031809e-04
## points_worst       2.247340e-02 -0.0353341030  2.276561e-03
## symmetry_worst     4.922100e-03 -0.0133523613 -3.910451e-04
## dimension_worst   -2.356283e-02 -0.0115053741 -1.897779e-03
```

```
# Sample scores stored in cancer_pca$x
head(cancer_pca$x)
```

```
##            PC1         PC2        PC3        PC4         PC5        PC6
## [1,] 2.501946 -0.09694805 -0.4489597  2.3341176  0.69771548 -0.2430058
## [2,] 1.467439 -1.68630059  1.1542039  0.3362109  0.45962538  1.2308248
## [3,] 2.929028 -0.38319924 -0.8955891 -0.1164828  0.98441377 -0.2587872
## [4,] 1.995342 -1.33046592  1.1172876  2.0502761  0.25303846 -1.5539634
## [5,] 2.500252  2.01035097 -0.7584035  1.9862169 -1.13537096  0.5940361
## [6,] 2.018308 -0.78242095  0.1125197 -0.6532280  0.01841577  0.6914453
##             PC7         PC8        PC9        PC10       PC11        PC12
## [1,]  0.5092015 -1.11423307  0.2840243  0.32463197 -0.3245353  0.04981306
## [2,]  0.2937434  0.10000461 -0.0668399  0.42612180  0.4564029  1.19357566
## [3,] -0.3303385  0.03599041  0.8734350  0.02222192  0.4208602 -0.06687286
## [4,] -0.9692185 -1.31852134  0.6254396  0.05666470 -0.0691646  0.97082409
## [5,]  0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533  0.03266208
## [6,]  0.1454026  0.06214539  0.2342454  0.73681239 -0.3671239 -0.77029743
##             PC13       PC14         PC15        PC16        PC17
## [1,] -0.19760220  0.1134403 -0.059302558  0.16637723 -0.04286656
## [2,]  0.01807424 -0.2824292 -0.204858888 -0.07067959  0.03088787
## [3,]  0.37435458  0.2585457 -0.330274216 -0.13000189 -0.24616091
## [4,] -0.90968379  0.2179117 -0.665825669  0.10213387 -0.10289446
## [5,] -0.35547138 -0.1480140 -0.005540503 -0.06495881  0.22273309
## [6,] -0.49542291 -0.2992431  0.049952835 -0.20161083  0.14920422
##              PC18        PC19        PC20        PC21        PC22
## [1,] -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## [2,] -0.405534243 -0.02886103 -0.05262226 -0.05987170  0.05868642
## [3,]  0.327711259  0.15937793 -0.13804895 -0.13489743  0.10080029
## [4,]  0.197085181  0.36251771 -0.40018239 -0.10302093 -0.28821708
## [5,] -0.129129156 -0.35877054  0.08515543 -0.08500541 -0.06332008
## [6,] -0.002229379 -0.08178568  0.18970936 -0.06872875  0.09669594
##              PC23         PC24         PC25        PC26         PC27
## [1,] -0.038971937  0.062212075  0.088438866  0.04872948 -0.007000724
## [2,]  0.070978613 -0.030822339 -0.016741580  0.04173030 -0.059332996
## [3,]  0.053909008  0.085484364  0.038277664 -0.04151896 -0.035546410
## [4,]  0.182045907  0.222848059 -0.115720065 -0.03676948 -0.148171674
## [5,]  0.043591030  0.008165322  0.002738052  0.05983731  0.046167735
## [6,] -0.001458054 -0.031338348  0.042784223 -0.08646068 -0.030944690
##             PC28         PC29         PC30         PC31
## [1,]  0.05356131  0.015184882  0.015985406  0.001396101
## [2,] -0.18696553  0.027011311 -0.000803330  0.008096490
## [3,] -0.07653067 -0.014640388  0.010307894  0.009074601
## [4,] -0.01711665 -0.047828494  0.023862995  0.000265075
## [5,]  0.03835364  0.032450800 -0.002312178 -0.002563269
## [6,]  0.00955434 -0.004403431  0.003869919 -0.002931194
```

```
# Identifying the scores by their diagnosis
diag_pca <- cbind(data.frame(diagnosis),cancer_pca$x)
head(diag_pca)
```

```
##   diagnosis      PC1         PC2        PC3        PC4         PC5
## 1         B 2.501946 -0.09694805 -0.4489597  2.3341176  0.69771548
## 2         B 1.467439 -1.68630059  1.1542039  0.3362109  0.45962538
## 3         B 2.929028 -0.38319924 -0.8955891 -0.1164828  0.98441377
## 4         B 1.995342 -1.33046592  1.1172876  2.0502761  0.25303846
## 5         B 2.500252  2.01035097 -0.7584035  1.9862169 -1.13537096
## 6         B 2.018308 -0.78242095  0.1125197 -0.6532280  0.01841577
##          PC6        PC7         PC8        PC9        PC10       PC11
## 1 -0.2430058  0.5092015 -1.11423307  0.2840243  0.32463197 -0.3245353
## 2  1.2308248  0.2937434  0.10000461 -0.0668399  0.42612180  0.4564029
## 3 -0.2587872 -0.3303385  0.03599041  0.8734350  0.02222192  0.4208602
## 4 -1.5539634 -0.9692185 -1.31852134  0.6254396  0.05666470 -0.0691646
## 5  0.5940361  0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533
## 6  0.6914453  0.1454026  0.06214539  0.2342454  0.73681239 -0.3671239
##          PC12        PC13       PC14         PC15        PC16        PC17
## 1  0.04981306 -0.19760220  0.1134403 -0.059302558  0.16637723 -0.04286656
## 2  1.19357566  0.01807424 -0.2824292 -0.204858888 -0.07067959  0.03088787
## 3 -0.06687286  0.37435458  0.2585457 -0.330274216 -0.13000189 -0.24616091
## 4  0.97082409 -0.90968379  0.2179117 -0.665825669  0.10213387 -0.10289446
## 5  0.03266208 -0.35547138 -0.1480140 -0.005540503 -0.06495881  0.22273309
## 6 -0.77029743 -0.49542291 -0.2992431  0.049952835 -0.20161083  0.14920422
##           PC18        PC19        PC20        PC21        PC22
## 1 -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## 2 -0.405534243 -0.02886103 -0.05262226 -0.05987170  0.05868642
## 3  0.327711259  0.15937793 -0.13804895 -0.13489743  0.10080029
## 4  0.197085181  0.36251771 -0.40018239 -0.10302093 -0.28821708
## 5 -0.129129156 -0.35877054  0.08515543 -0.08500541 -0.06332008
## 6 -0.002229379 -0.08178568  0.18970936 -0.06872875  0.09669594
##           PC23         PC24         PC25        PC26         PC27
## 1 -0.038971937  0.062212075  0.088438866  0.04872948 -0.007000724
## 2  0.070978613 -0.030822339 -0.016741580  0.04173030 -0.059332996
## 3  0.053909008  0.085484364  0.038277664 -0.04151896 -0.035546410
## 4  0.182045907  0.222848059 -0.115720065 -0.03676948 -0.148171674
## 5  0.043591030  0.008165322  0.002738052  0.05983731  0.046167735
## 6 -0.001458054 -0.031338348  0.042784223 -0.08646068 -0.030944690
##          PC28         PC29         PC30         PC31
## 1  0.05356131  0.015184882  0.015985406  0.001396101
## 2 -0.18696553  0.027011311 -0.000803330  0.008096490
## 3 -0.07653067 -0.014640388  0.010307894  0.009074601
## 4 -0.01711665 -0.047828494  0.023862995  0.000265075
## 5  0.03835364  0.032450800 -0.002312178 -0.002563269
## 6  0.00955434 -0.004403431  0.003869919 -0.002931194
```

```
# Means of scores for all the PC's classified by diagnosis status
tabmeansPC <- aggregate(diag_pca[,2:31],by=list(diagnosis=cancer$diagnosis),mean)
tabmeansPC
```

```
##   diagnosis       PC1        PC2        PC3        PC4         PC5
## 1         B  2.204253 -0.3436398  0.2160542  0.1384470 -0.09800974
## 2         M -3.711879  0.5786765 -0.3638272 -0.2331395  0.16504470
##            PC6         PC7         PC8         PC9        PC10
## 1  0.004373132  0.01691799  0.04905754  0.03377092 -0.01002704
## 2 -0.007364189 -0.02848926 -0.08261104 -0.05686895  0.01688516
##            PC11         PC12         PC13        PC14        PC15
## 1 -0.0007888591  0.006017621  0.003305282 -0.03736471 -0.02453152
## 2  0.0013284090 -0.010133446 -0.005565970  0.06292076  0.04131016
##          PC16          PC17         PC18        PC19         PC20
## 1 -0.02516699  0.0001112917  0.006103777 -0.01307695 -0.009733891
## 2  0.04238026 -0.0001874111 -0.010278530  0.02202108  0.016391505
##           PC21         PC22         PC23         PC24         PC25
## 1 -0.008359794 -0.006225063 -0.003024993  0.002609428  0.007813479
## 2  0.014077577  0.010482771  0.005093974 -0.004394179 -0.013157604
##           PC26         PC27         PC28          PC29          PC30
## 1 -0.000879209 -0.003967725 -0.001909259 -0.0003418423 -0.0009838392
## 2  0.001480555  0.006681499  0.003215121  0.0005756496  0.0016567480
```

```
tabmeansPC <- tabmeansPC[rev(order(tabmeansPC$diagnosis)),]
tabmeansPC
```

```
##   diagnosis       PC1        PC2        PC3        PC4         PC5
## 2         M -3.711879  0.5786765 -0.3638272 -0.2331395  0.16504470
## 1         B  2.204253 -0.3436398  0.2160542  0.1384470 -0.09800974
##             PC6          PC7         PC8         PC9        PC10
## 2 -0.007364189 -0.02848926 -0.08261104 -0.05686895  0.01688516
## 1  0.004373132  0.01691799  0.04905754  0.03377092 -0.01002704
##            PC11          PC12         PC13        PC14        PC15
## 2  0.0013284090 -0.010133446 -0.005565970  0.06292076  0.04131016
## 1 -0.0007888591  0.006017621  0.003305282 -0.03736471 -0.02453152
##           PC16          PC17         PC18        PC19         PC20
## 2  0.04238026 -0.0001874111 -0.010278530  0.02202108  0.016391505
## 1 -0.02516699  0.0001112917  0.006103777 -0.01307695 -0.009733891
##            PC21         PC22         PC23         PC24         PC25
## 2  0.014077577  0.010482771  0.005093974 -0.004394179 -0.013157604
## 1 -0.008359794 -0.006225063 -0.003024993  0.002609428  0.007813479
##            PC26         PC27         PC28          PC29          PC30
## 2  0.001480555  0.006681499  0.003215121  0.0005756496  0.0016567480
## 1 -0.000879209 -0.003967725 -0.001909259 -0.0003418423 -0.0009838392
```

```
tabfmeans <- t(tabmeansPC[,-1])
tabfmeans
```

```
##                   2             1
## PC1  -3.7118786952  2.2042528946
## PC2   0.5786764540 -0.3436397990
## PC3  -0.3638271826  0.2160542373
## PC4  -0.2331394896  0.1384469798
## PC5   0.1650447018 -0.0980097389
## PC6  -0.0073641886  0.0043731316
## PC7  -0.0284892608  0.0169179924
## PC8  -0.0826110415  0.0490575373
## PC9  -0.0568689505  0.0337709174
## PC10  0.0168851623 -0.0100270432
## PC11  0.0013284090 -0.0007888591
## PC12 -0.0101334459  0.0060176205
## PC13 -0.0055659702  0.0033052820
## PC14  0.0629207582 -0.0373647080
## PC15  0.0413101623 -0.0245315249
## PC16  0.0423802589 -0.0251669885
## PC17 -0.0001874111  0.0001112917
## PC18 -0.0102785304  0.0061037771
## PC19  0.0220210837 -0.0130769461
## PC20  0.0163915046 -0.0097338907
## PC21  0.0140775772 -0.0083597937
## PC22  0.0104827709 -0.0062250628
## PC23  0.0050939739 -0.0030249929
## PC24 -0.0043941787  0.0026094282
## PC25 -0.0131576035  0.0078134789
## PC26  0.0014805547 -0.0008792090
## PC27  0.0066814986 -0.0039677247
## PC28  0.0032151208 -0.0019092594
## PC29  0.0005756496 -0.0003418423
## PC30  0.0016567480 -0.0009838392
```

```
colnames(tabfmeans) <- t(as.vector(tabmeansPC[1]))
tabfmeans
```

```
##                  M            B
## PC1  -3.7118786952  2.2042528946
## PC2   0.5786764540 -0.3436397990
## PC3  -0.3638271826  0.2160542373
## PC4  -0.2331394896  0.1384469798
## PC5   0.1650447018 -0.0980097389
## PC6  -0.0073641886  0.0043731316
## PC7  -0.0284892608  0.0169179924
## PC8  -0.0826110415  0.0490575373
## PC9  -0.0568689505  0.0337709174
## PC10  0.0168851623 -0.0100270432
## PC11  0.0013284090 -0.0007888591
## PC12 -0.0101334459  0.0060176205
## PC13 -0.0055659702  0.0033052820
## PC14  0.0629207582 -0.0373647080
## PC15  0.0413101623 -0.0245315249
## PC16  0.0423802589 -0.0251669885
## PC17 -0.0001874111  0.0001112917
## PC18 -0.0102785304  0.0061037771
## PC19  0.0220210837 -0.0130769461
## PC20  0.0163915046 -0.0097338907
## PC21  0.0140775772 -0.0083597937
## PC22  0.0104827709 -0.0062250628
## PC23  0.0050939739 -0.0030249929
## PC24 -0.0043941787  0.0026094282
## PC25 -0.0131576035  0.0078134789
## PC26  0.0014805547 -0.0008792090
## PC27  0.0066814986 -0.0039677247
## PC28  0.0032151208 -0.0019092594
## PC29  0.0005756496 -0.0003418423
## PC30  0.0016567480 -0.0009838392
```

```
# Standard deviations of scores for all the PC's classified by diagnosis status
tabsdsPC <- aggregate(diag_pca[,2:31],by=list(cancer$diagnosis),sd)
tabfsds <- t(tabsdsPC[,-1])
colnames(tabfsds) <- t(as.vector(tabsdsPC[1]))
tabfsds
```

```
##                B          M
## PC1  1.63956487 3.02839244
## PC2  2.08691418 2.72966952
## PC3  1.36038677 2.07323861
## PC4  1.39613539 1.39927526
## PC5  1.39777817 1.04807636
## PC6  0.95340249 1.33789147
## PC7  0.95140466 1.05116532
## PC8  0.64932787 1.04212370
## PC9  0.65881989 0.70917409
## PC10 0.57998076 0.71917808
## PC11 0.60269891 0.57186757
## PC12 0.54006502 0.54668527
## PC13 0.51222488 0.51016086
## PC14 0.37926601 0.63294179
## PC15 0.38070917 0.41867516
## PC16 0.26760334 0.36012377
## PC17 0.26627925 0.30856638
## PC18 0.17881651 0.32377631
## PC19 0.17193548 0.30152802
## PC20 0.17202337 0.28613872
## PC21 0.15015083 0.21280261
## PC22 0.15982321 0.19320204
## PC23 0.14579937 0.19476702
## PC24 0.12247334 0.19984615
## PC25 0.11050781 0.16637188
## PC26 0.09806381 0.15950557
## PC27 0.07202620 0.11477556
## PC28 0.06617618 0.10565982
## PC29 0.02588741 0.05609976
## PC30 0.01834069 0.03798219
```

```
t.test(PC1~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC1 by cancer$diagnosis
## t = 26.251, df = 285.72, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5.472542 6.359721
## sample estimates:
## mean in group B mean in group M
##        2.204253       -3.711879
```

```
t.test(PC2~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC2 by cancer$diagnosis
## t = -4.2387, df = 357.38, p-value = 2.865e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.3502373 -0.4943952
## sample estimates:
## mean in group B mean in group M
##      -0.3436398       0.5786765
```

```
t.test(PC3~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC3 by cancer$diagnosis
## t = 3.6343, df = 320.28, p-value = 0.0003246
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.2659658 0.8937970
## sample estimates:
## mean in group B mean in group M
##       0.2160542      -0.3638272
```

```
t.test(PC4~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC4 by cancer$diagnosis
## t = 3.0652, df = 442.55, p-value = 0.002308
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.1333371 0.6098358
## sample estimates:
## mean in group B mean in group M
##       0.1384470      -0.2331395
```

```
t.test(PC5~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC5 by cancer$diagnosis
## t = -2.5485, df = 537.03, p-value = 0.0111
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.46581747 -0.06029141
## sample estimates:
## mean in group B mean in group M
##     -0.09800974      0.16504470
```

```
t.test(PC6~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC6 by cancer$diagnosis
## t = 0.11197, df = 339.17, p-value = 0.9109
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1944615  0.2179362
## sample estimates:
## mean in group B mean in group M
##     0.004373132    -0.007364189
```

```
t.test(PC7~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC7 by cancer$diagnosis
## t = 0.51587, df = 408.87, p-value = 0.6062
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1276209  0.2184354
## sample estimates:
## mean in group B mean in group M
##      0.01691799     -0.02848926
```

```
t.test(PC8~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC8 by cancer$diagnosis
## t = 1.6584, df = 309.75, p-value = 0.09825
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.02455572  0.28789287
## sample estimates:
## mean in group B mean in group M
##      0.04905754     -0.08261104
```

```
t.test(PC9~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC9 by cancer$diagnosis
## t = 1.5132, df = 417.67, p-value = 0.131
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.0271048  0.2083845
## sample estimates:
## mean in group B mean in group M
##      0.03377092     -0.05686895
```

```
t.test(PC10~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC10 by cancer$diagnosis
## t = -0.46277, df = 372.52, p-value = 0.6438
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.14126432  0.08743991
## sample estimates:
## mean in group B mean in group M
##     -0.01002704      0.01688516
```

```
t.test(PC11~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC11 by cancer$diagnosis
## t = -0.041845, df = 462.01, p-value = 0.9666
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.10154692  0.09731238
## sample estimates:
## mean in group B mean in group M
##   -0.0007888591    0.0013284090
```

```
t.test(PC12~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC12 by cancer$diagnosis
## t = 0.34227, df = 439.04, p-value = 0.7323
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.07659212  0.10889425
## sample estimates:
## mean in group B mean in group M
##     0.006017621    -0.010133446
```

```
t.test(PC13~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC13 by cancer$diagnosis
## t = 0.20025, df = 444.77, p-value = 0.8414
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.07819457  0.09593708
## sample estimates:
## mean in group B mean in group M
##     0.003305282    -0.005565970
```

```
t.test(PC14~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC14 by cancer$diagnosis
## t = -2.0945, df = 302.42, p-value = 0.03705
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.194508096 -0.006062836
## sample estimates:
## mean in group B mean in group M
##     -0.03736471      0.06292076
```

```
t.test(PC15~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC15 by cancer$diagnosis
## t = -1.8752, df = 410.43, p-value = 0.06147
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.134862771  0.003179396
## sample estimates:
## mean in group B mean in group M
##     -0.02453152      0.04131016
```

```
t.test(PC16~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC16 by cancer$diagnosis
## t = -2.37, df = 349.77, p-value = 0.01833
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.12360307 -0.01149143
## sample estimates:
## mean in group B mean in group M
##     -0.02516699      0.04238026
```

```
t.test(PC17~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC17 by cancer$diagnosis
## t = 0.011737, df = 393.3, p-value = 0.9906
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.04973747  0.05033487
## sample estimates:
## mean in group B mean in group M
##    0.0001112917   -0.0001874111
```

```
t.test(PC18~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC18 by cancer$diagnosis
## t = 0.67787, df = 288.75, p-value = 0.4984
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.03118389  0.06394850
## sample estimates:
## mean in group B mean in group M
##     0.006103777    -0.010278530
```

```
t.test(PC19~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC19 by cancer$diagnosis
## t = -1.5516, df = 293.85, p-value = 0.1218
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.079616015  0.009419955
## sample estimates:
## mean in group B mean in group M
##     -0.01307695      0.02202108
```

```
t.test(PC20~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC20 by cancer$diagnosis
## t = -1.2062, df = 303.02, p-value = 0.2287
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.06874572  0.01649493
## sample estimates:
## mean in group B mean in group M
##    -0.009733891     0.016391505
```

```
t.test(PC21~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC21 by cancer$diagnosis
## t = -1.3487, df = 336.76, p-value = 0.1783
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.05516116  0.01028642
## sample estimates:
## mean in group B mean in group M
##    -0.008359794     0.014077577
```

```
t.test(PC22~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC22 by cancer$diagnosis
## t = -1.0618, df = 380.13, p-value = 0.289
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.04764831  0.01423264
## sample estimates:
## mean in group B mean in group M
##    -0.006225063     0.010482771
```

```
t.test(PC23~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC23 by cancer$diagnosis
## t = -0.52575, df = 351.71, p-value = 0.5994
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.03849078  0.02225285
## sample estimates:
## mean in group B mean in group M
##    -0.003024993     0.005093974
```

```
t.test(PC24~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC24 by cancer$diagnosis
## t = 0.4614, df = 306.57, p-value = 0.6448
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.02286480  0.03687201
## sample estimates:
## mean in group B mean in group M
##     0.002609428    -0.004394179
```

```
t.test(PC25~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC25 by cancer$diagnosis
## t = 1.6337, df = 322.91, p-value = 0.1033
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.004282315  0.046224480
## sample estimates:
## mean in group B mean in group M
##     0.007813479    -0.013157604
```

```
t.test(PC26~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC26 by cancer$diagnosis
## t = -0.19467, df = 307.18, p-value = 0.8458
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.02621273  0.02149320
## sample estimates:
## mean in group B mean in group M
##    -0.000879209     0.001480555
```

```
t.test(PC27~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC27 by cancer$diagnosis
## t = -1.2162, df = 311.14, p-value = 0.2248
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.027878004  0.006579557
## sample estimates:
## mean in group B mean in group M
##    -0.003967725     0.006681499
```

```
t.test(PC28~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC28 by cancer$diagnosis
## t = -0.63596, df = 310.76, p-value = 0.5253
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.02097902  0.01073026
## sample estimates:
## mean in group B mean in group M
##    -0.001909259     0.003215121
```

```
t.test(PC29~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC29 by cancer$diagnosis
## t = -0.22436, df = 265.22, p-value = 0.8226
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.008969119  0.007134135
## sample estimates:
## mean in group B mean in group M
##   -0.0003418423    0.0005756496
```

```
t.test(PC30~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC30 by cancer$diagnosis
## t = -0.9487, df = 270.4, p-value = 0.3436
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.008120430  0.002839256
## sample estimates:
## mean in group B mean in group M
##   -0.0009838392    0.0016567480
```

```
t.test(PC31~cancer$diagnosis,data=diag_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC31 by cancer$diagnosis
## t = -0.54256, df = 278.74, p-value = 0.5879
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.002917016  0.001656473
## sample estimates:
## mean in group B mean in group M
##   -0.0002348289    0.0003954429
```

```
# F ratio tests
var.test(PC1~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC1 by cancer$diagnosis
## F = 0.29311, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2293890 0.3717204
## sample estimates:
## ratio of variances
##          0.2931115
```

```
var.test(PC2~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC2 by cancer$diagnosis
## F = 0.58451, num df = 356, denom df = 211, p-value = 8.474e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.4574343 0.7412633
## sample estimates:
## ratio of variances
##          0.5845061
```

```
var.test(PC3~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC3 by cancer$diagnosis
## F = 0.43055, num df = 356, denom df = 211, p-value = 2.327e-12
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3369504 0.5460214
## sample estimates:
## ratio of variances
##          0.4305526
```

```
var.test(PC4~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC4 by cancer$diagnosis
## F = 0.99552, num df = 356, denom df = 211, p-value = 0.9625
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7790915 1.2625024
## sample estimates:
## ratio of variances
##          0.9955172
```

```
var.test(PC5~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC5 by cancer$diagnosis
## F = 1.7787, num df = 356, denom df = 211, p-value = 5.82e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.391972 2.255662
## sample estimates:
## ratio of variances
##           1.778651
```

```
var.test(PC6~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC6 by cancer$diagnosis
## F = 0.50782, num df = 356, denom df = 211, p-value = 1.795e-08
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3974207 0.6440124
## sample estimates:
## ratio of variances
##          0.5078212
```

```
var.test(PC7~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC7 by cancer$diagnosis
## F = 0.8192, num df = 356, denom df = 211, p-value = 0.1
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6411036 1.0388957
## sample estimates:
## ratio of variances
##          0.8191973
```

```
var.test(PC8~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC8 by cancer$diagnosis
## F = 0.38823, num df = 356, denom df = 211, p-value = 3.319e-15
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3038290 0.4923489
## sample estimates:
## ratio of variances
##          0.3882304
```

```
var.test(PC9~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC9 by cancer$diagnosis
## F = 0.86303, num df = 356, denom df = 211, p-value = 0.2243
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6754099 1.0944883
## sample estimates:
## ratio of variances
##          0.8630336
```

```
var.test(PC10~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC10 by cancer$diagnosis
## F = 0.65036, num df = 356, denom df = 211, p-value = 0.0003698
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.5089722 0.8247793
## sample estimates:
## ratio of variances
##          0.6503607
```

```
var.test(PC11~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC11 by cancer$diagnosis
## F = 1.1107, num df = 356, denom df = 211, p-value = 0.4012
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.8692598 1.4086183
## sample estimates:
## ratio of variances
##           1.110734
```

```
var.test(PC12~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC12 by cancer$diagnosis
## F = 0.97593, num df = 356, denom df = 211, p-value = 0.8346
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7637603 1.2376584
## sample estimates:
## ratio of variances
##           0.975927
```

```
var.test(PC13~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC13 by cancer$diagnosis
## F = 1.0081, num df = 356, denom df = 211, p-value = 0.956
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7889451 1.2784699
## sample estimates:
## ratio of variances
##           1.008108
```

```
var.test(PC14~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC14 by cancer$diagnosis
## F = 0.35905, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2809959 0.4553483
## sample estimates:
## ratio of variances
##          0.3590544
```

```
var.test(PC15~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC15 by cancer$diagnosis
## F = 0.82686, num df = 356, denom df = 211, p-value = 0.1169
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6471009 1.0486142
## sample estimates:
## ratio of variances
##          0.8268605
```

```
var.test(PC16~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC16 by cancer$diagnosis
## F = 0.55218, num df = 356, denom df = 211, p-value = 8.26e-07
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.4321348 0.7002658
## sample estimates:
## ratio of variances
##          0.5521785
```

```
var.test(PC17~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC17 by cancer$diagnosis
## F = 0.74469, num df = 356, denom df = 211, p-value = 0.01494
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.5827968 0.9444106
## sample estimates:
## ratio of variances
##          0.7446933
```

```
var.test(PC18~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC18 by cancer$diagnosis
## F = 0.30502, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2387068 0.3868197
## sample estimates:
## ratio of variances
##          0.3050177
```

```
var.test(PC19~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC19 by cancer$diagnosis
## F = 0.32514, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2544576 0.4123434
## sample estimates:
## ratio of variances
##          0.3251439
```

```
var.test(PC20~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC20 by cancer$diagnosis
## F = 0.36143, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2828534 0.4583583
## sample estimates:
## ratio of variances
##          0.3614279
```

```
var.test(PC21~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC21 by cancer$diagnosis
## F = 0.49785, num df = 356, denom df = 211, p-value = 6.758e-09
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3896201 0.6313716
## sample estimates:
## ratio of variances
##          0.4978535
```

```
var.test(PC22~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC22 by cancer$diagnosis
## F = 0.68432, num df = 356, denom df = 211, p-value = 0.001709
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.5355451 0.8678402
## sample estimates:
## ratio of variances
##          0.6843154
```

```
var.test(PC23~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC23 by cancer$diagnosis
## F = 0.56038, num df = 356, denom df = 211, p-value = 1.542e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.4385511 0.7106634
## sample estimates:
## ratio of variances
##          0.5603772
```

```
var.test(PC24~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC24 by cancer$diagnosis
## F = 0.37557, num df = 356, denom df = 211, p-value = 3.495e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2939215 0.4762939
## sample estimates:
## ratio of variances
##          0.3755706
```

```
var.test(PC25~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC25 by cancer$diagnosis
## F = 0.44119, num df = 356, denom df = 211, p-value = 9.824e-12
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3452756 0.5595122
## sample estimates:
## ratio of variances
##          0.4411905
```

```
var.test(PC26~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC26 by cancer$diagnosis
## F = 0.37798, num df = 356, denom df = 211, p-value = 5.423e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2958050 0.4793461
## sample estimates:
## ratio of variances
##          0.3779774
```

```
var.test(PC27~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC27 by cancer$diagnosis
## F = 0.39381, num df = 356, denom df = 211, p-value = 8.544e-15
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3081924 0.4994196
## sample estimates:
## ratio of variances
##          0.3938058
```

```
var.test(PC28~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC28 by cancer$diagnosis
## F = 0.39227, num df = 356, denom df = 211, p-value = 6.601e-15
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3069894 0.4974701
## sample estimates:
## ratio of variances
##          0.3922686
```

```
var.test(PC29~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC29 by cancer$diagnosis
## F = 0.21294, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.1666460 0.2700465
## sample estimates:
## ratio of variances
##          0.2129389
```

```
var.test(PC30~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC30 by cancer$diagnosis
## F = 0.23317, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.1824782 0.2957024
## sample estimates:
## ratio of variances
##          0.2331693
```

```
var.test(PC31~cancer$diagnosis,data=diag_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC31 by cancer$diagnosis
## F = 0.26577, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2079951 0.3370519
## sample estimates:
## ratio of variances
##          0.2657746
```

```
# Levene's tests (one-sided)
library(car)
(LTPC1 <- leveneTest(PC1~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1  62.132 1.654e-14 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC1_1sided <- LTPC1[[3]][1]/2)
```

```
## [1] 8.268824e-15
```

```
(LTPC2 <- leveneTest(PC2~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value   Pr(>F)
## group   1  18.786 1.73e-05 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC2_1sided=LTPC2[[3]][1]/2)
```

```
## [1] 8.651441e-06
```

```
(LTPC3 <- leveneTest(PC3~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   1   27.65 2.063e-07 ***
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC3_1sided <- LTPC3[[3]][1]/2)
```

```
## [1] 1.031266e-07
```

```
(LTPC4 <- leveneTest(PC4~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group   1   2e-04  0.989
##       567
```

```
(p_PC4_1sided <- LTPC4[[3]][1]/2)
```

```
## [1] 0.4944984
```

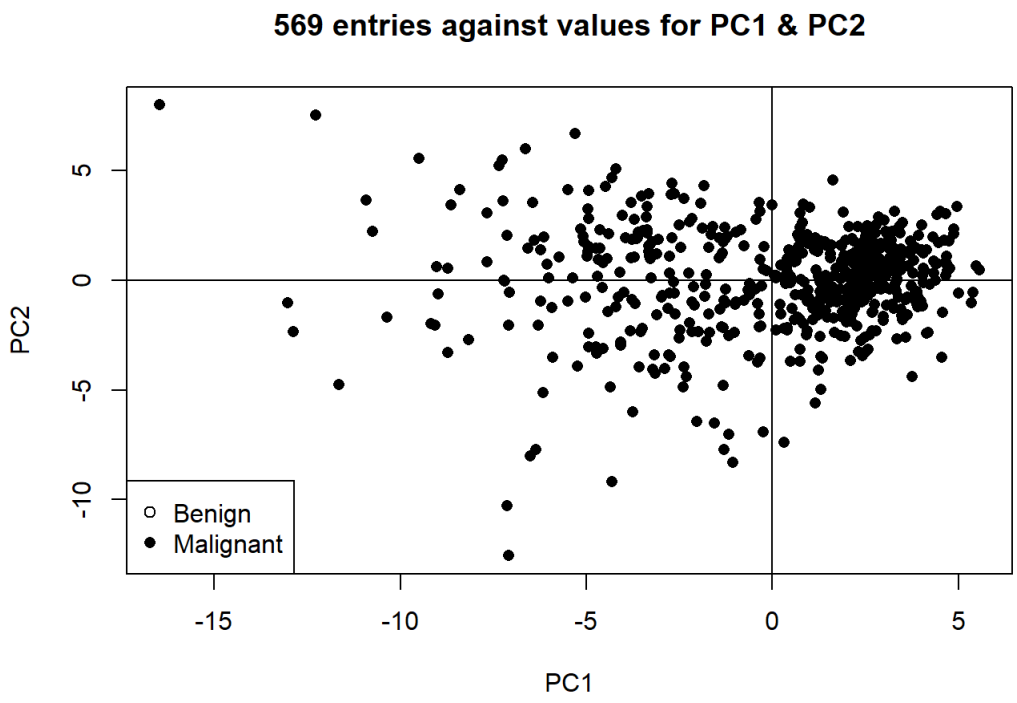
```
(LTPC5 <- leveneTest(PC5~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value   Pr(>F)
## group   1  6.8535 0.009083 **
##       567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

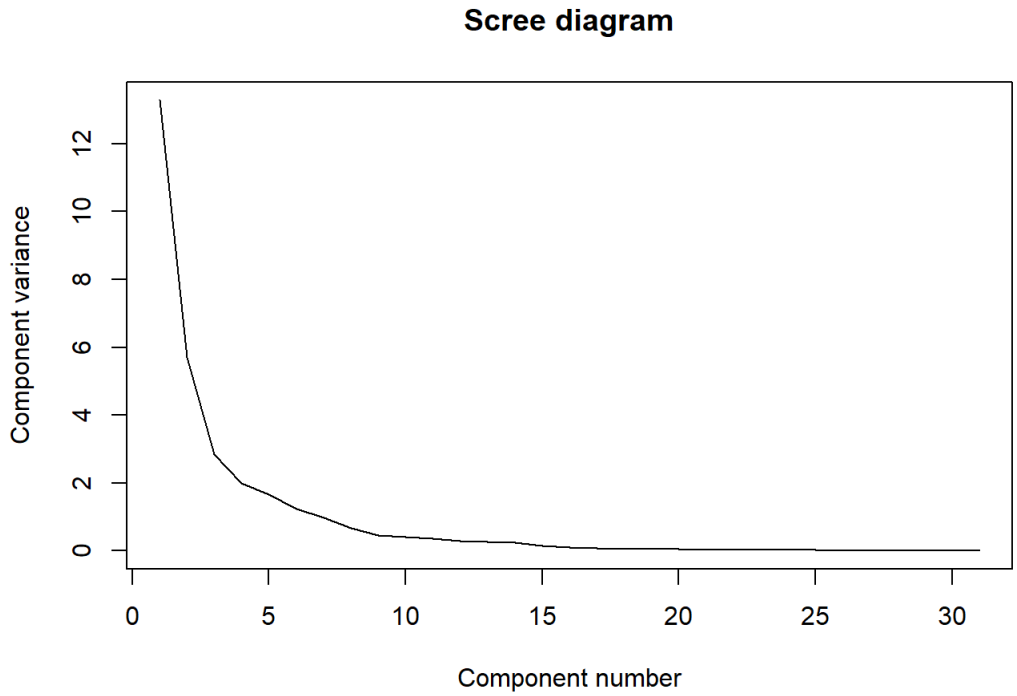
```
(p_PC5_1sided <- LTPC5[[3]][1]/2)
```

```
## [1] 0.004541533
```

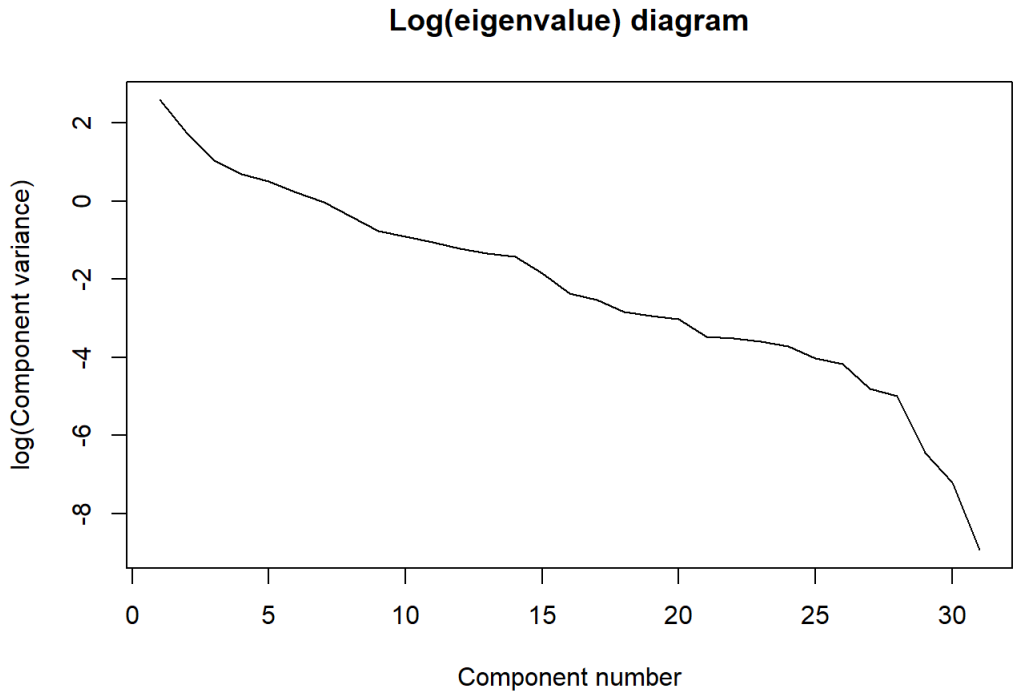
```
# Plotting the scores for the first and second components
plot(diag_pca$PC1, diag_pca$PC2,pch=ifelse(diag_pca$diagnosis == "S",1,16),xlab="PC1", ylab="PC2", main="569 entries against values for PC1 & PC2")
abline(h=0)
abline(v=0)
legend("bottomleft", legend=c("Benign","Malignant"), pch=c(1,16))
```




```
plot(eigen_cancer, xlab = "Component number", ylab = "Component variance", type = "l", main = "Scree diagram")
```




```
plot(log(eigen_cancer), xlab = "Component number",ylab = "log(Component variance)", type="l",main = "Log(eigenvalue) diagram")
```




```
print(summary(cancer_pca))
```

```
## Importance of components:
##                           PC1    PC2     PC3     PC4     PC5     PC6
## Standard deviation     3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion  0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##                           PC7     PC8     PC9   PC10    PC11    PC12
## Standard deviation     0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion  0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##                           PC13    PC14    PC15    PC16    PC17   PC18
## Standard deviation     0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion  0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##                           PC19    PC20   PC21    PC22    PC23    PC24
## Standard deviation     0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion  0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##                           PC25   PC26    PC27    PC28    PC29    PC30
## Standard deviation     0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion  0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##                           PC31
## Standard deviation     0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion  1.00000
```

```
#View(cancer_pca)
diag(cov(cancer_pca$x))
```

```
##          PC1          PC2          PC3          PC4          PC5
## 1.328806e+01 5.696805e+00 2.835395e+00 1.981357e+00 1.648815e+00
##          PC6          PC7          PC8          PC9         PC10
## 1.234673e+00 9.782732e-01 6.717530e-01 4.607924e-01 4.031331e-01
##         PC11         PC12         PC13         PC14         PC15
## 3.491550e-01 2.938904e-01 2.611469e-01 2.413302e-01 1.569736e-01
##         PC16         PC17         PC18         PC19         PC20
## 9.412853e-02 7.980995e-02 5.904627e-02 5.259119e-02 4.912193e-02
##         PC21         PC22         PC23         PC24         PC25
## 3.107078e-02 2.994121e-02 2.743052e-02 2.424902e-02 1.803936e-02
##         PC26         PC27         PC28         PC29         PC30
## 1.547973e-02 8.171699e-03 6.898103e-03 1.589338e-03 7.483761e-04
##         PC31
## 1.330402e-04
```

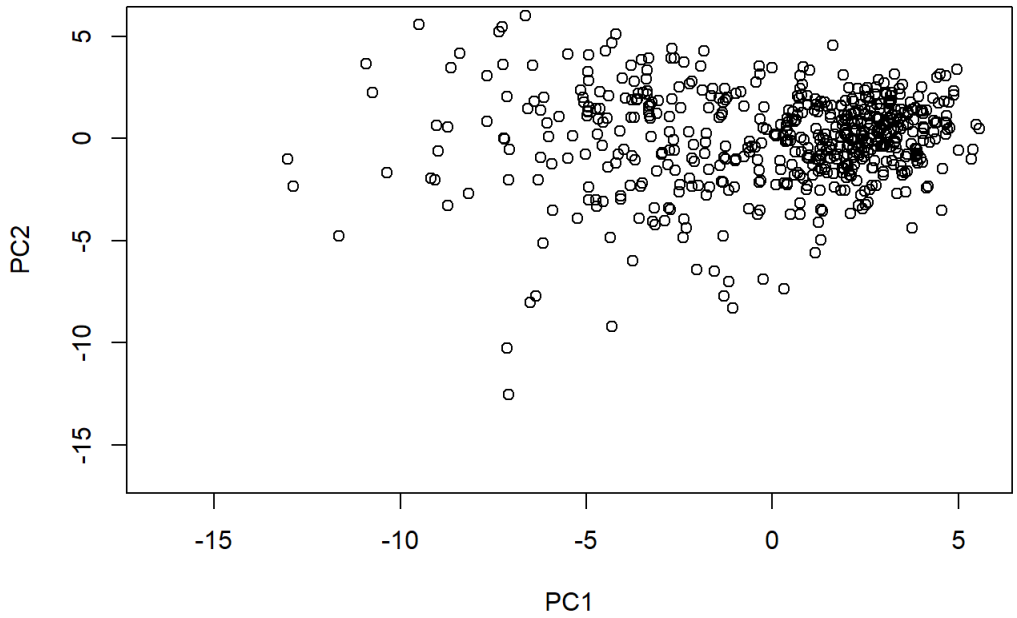
```
xlim <- range(cancer_pca$x[,1])
head(cancer_pca$x[,1])
```

```
## [1] 2.501946 1.467439 2.929028 1.995342 2.500252 2.018308
```

```
head(cancer_pca$x)
```

```
##            PC1         PC2        PC3        PC4         PC5        PC6
## [1,] 2.501946 -0.09694805 -0.4489597  2.3341176  0.69771548 -0.2430058
## [2,] 1.467439 -1.68630059  1.1542039  0.3362109  0.45962538  1.2308248
## [3,] 2.929028 -0.38319924 -0.8955891 -0.1164828  0.98441377 -0.2587872
## [4,] 1.995342 -1.33046592  1.1172876  2.0502761  0.25303846 -1.5539634
## [5,] 2.500252  2.01035097 -0.7584035  1.9862169 -1.13537096  0.5940361
## [6,] 2.018308 -0.78242095  0.1125197 -0.6532280  0.01841577  0.6914453
##             PC7         PC8        PC9        PC10       PC11        PC12
## [1,]  0.5092015 -1.11423307  0.2840243  0.32463197 -0.3245353  0.04981306
## [2,]  0.2937434  0.10000461 -0.0668399  0.42612180  0.4564029  1.19357566
## [3,] -0.3303385  0.03599041  0.8734350  0.02222192  0.4208602 -0.06687286
## [4,] -0.9692185 -1.31852134  0.6254396  0.05666470 -0.0691646  0.97082409
## [5,]  0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533  0.03266208
## [6,]  0.1454026  0.06214539  0.2342454  0.73681239 -0.3671239 -0.77029743
##             PC13       PC14         PC15        PC16        PC17
## [1,] -0.19760220  0.1134403 -0.059302558  0.16637723 -0.04286656
## [2,]  0.01807424 -0.2824292 -0.204858888 -0.07067959  0.03088787
## [3,]  0.37435458  0.2585457 -0.330274216 -0.13000189 -0.24616091
## [4,] -0.90968379  0.2179117 -0.665825669  0.10213387 -0.10289446
## [5,] -0.35547138 -0.1480140 -0.005540503 -0.06495881  0.22273309
## [6,] -0.49542291 -0.2992431  0.049952835 -0.20161083  0.14920422
##              PC18        PC19        PC20        PC21        PC22
## [1,] -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## [2,] -0.405534243 -0.02886103 -0.05262226 -0.05987170  0.05868642
## [3,]  0.327711259  0.15937793 -0.13804895 -0.13489743  0.10080029
## [4,]  0.197085181  0.36251771 -0.40018239 -0.10302093 -0.28821708
## [5,] -0.129129156 -0.35877054  0.08515543 -0.08500541 -0.06332008
## [6,] -0.002229379 -0.08178568  0.18970936 -0.06872875  0.09669594
##              PC23         PC24         PC25        PC26         PC27
## [1,] -0.038971937  0.062212075  0.088438866  0.04872948 -0.007000724
## [2,]  0.070978613 -0.030822339 -0.016741580  0.04173030 -0.059332996
## [3,]  0.053909008  0.085484364  0.038277664 -0.04151896 -0.035546410
## [4,]  0.182045907  0.222848059 -0.115720065 -0.03676948 -0.148171674
## [5,]  0.043591030  0.008165322  0.002738052  0.05983731  0.046167735
## [6,] -0.001458054 -0.031338348  0.042784223 -0.08646068 -0.030944690
##             PC28         PC29         PC30         PC31
## [1,]  0.05356131  0.015184882  0.015985406  0.001396101
## [2,] -0.18696553  0.027011311 -0.000803330  0.008096490
## [3,] -0.07653067 -0.014640388  0.010307894  0.009074601
## [4,] -0.01711665 -0.047828494  0.023862995  0.000265075
## [5,]  0.03835364  0.032450800 -0.002312178 -0.002563269
## [6,]  0.00955434 -0.004403431  0.003869919 -0.002931194
```

```
plot(cancer_pca$x,xlim=xlim,ylim=xlim)
```




```
#Factor Analysis
library(psych)
```

```
## Warning: package 'psych' was built under R version 3.5.3
```

```
##
## Attaching package: 'psych'
```

```
## The following object is masked from 'package:car':
##
##     logit
```

```
## The following objects are masked from 'package:ggplot2':
##
##     %+%, alpha
```

```
#install.packages("psych", lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
library(psych)
fit.pc <- principal(cancer[-2], nfactors=4, rotate="varimax")
fit.pc
```

```
## Principal Components Analysis
## Call: principal(r = cancer[-2], nfactors = 4, rotate = "varimax")
## Standardized loadings (pattern matrix) based upon correlation matrix
##                       RC1   RC2   RC3   RC4    h2    u2 com
## id                   0.13 -0.10  0.10  0.07 0.042 0.958 3.3
## radius_mean          0.95  0.13 -0.14  0.10 0.951 0.049 1.1
## texture_mean         0.25  0.06  0.05  0.91 0.897 0.103 1.2
## perimeter_mean       0.95  0.17 -0.11  0.10 0.954 0.046 1.1
## area_mean            0.97  0.10 -0.08  0.09 0.960 0.040 1.1
## smoothness_mean      0.16  0.65  0.26 -0.19 0.547 0.453 1.6
## compactness_mean     0.46  0.77  0.32  0.05 0.910 0.090 2.0
## concavity_mean       0.66  0.61  0.31  0.10 0.908 0.092 2.5
## points_mean          0.80  0.51  0.15  0.05 0.921 0.079 1.8
## symmetry_mean        0.14  0.58  0.33 -0.06 0.474 0.526 1.7
## dimension_mean      -0.31  0.66  0.53 -0.10 0.826 0.174 2.4
## radius_se            0.83  0.00  0.40  0.03 0.850 0.150 1.4
## texture_se          -0.05 -0.21  0.60  0.54 0.693 0.307 2.3
## perimeter_se         0.82  0.04  0.42  0.04 0.855 0.145 1.5
## area_se              0.88 -0.02  0.26  0.01 0.836 0.164 1.2
## smoothness_se       -0.14  0.00  0.70 -0.05 0.518 0.482 1.1
## compactness_se       0.20  0.51  0.67  0.11 0.762 0.238 2.2
## concavity_se         0.22  0.41  0.63  0.07 0.622 0.378 2.0
## points_se            0.43  0.33  0.64  0.00 0.697 0.303 2.3
## symmetry_se         -0.04  0.06  0.67 -0.03 0.451 0.549 1.0
## dimension_se        -0.03  0.38  0.75  0.01 0.713 0.287 1.5
## radius_worst         0.94  0.21 -0.16  0.13 0.972 0.028 1.2
## texture_worst        0.20  0.19 -0.08  0.93 0.956 0.044 1.2
## perimeter_worst      0.94  0.25 -0.13  0.13 0.978 0.022 1.2
## area_worst           0.94  0.16 -0.12  0.12 0.947 0.053 1.1
## smoothness_worst     0.06  0.75  0.01 -0.01 0.572 0.428 1.0
## compactness_worst    0.31  0.86  0.06  0.19 0.877 0.123 1.4
## concavity_worst      0.45  0.77  0.10  0.19 0.845 0.155 1.8
## points_worst         0.68  0.67 -0.02  0.11 0.918 0.082 2.1
## symmetry_worst       0.07  0.72 -0.06  0.06 0.526 0.474 1.0
## dimension_worst     -0.09  0.88  0.18  0.10 0.825 0.175 1.1
##
##                        RC1  RC2  RC3  RC4
## SS loadings          10.15 7.04 4.36 2.25
## Proportion Var        0.33 0.23 0.14 0.07
## Cumulative Var        0.33 0.55 0.70 0.77
## Proportion Explained  0.43 0.30 0.18 0.09
## Cumulative Proportion 0.43 0.72 0.91 1.00
##
## Mean item complexity =  1.6
## Test of the hypothesis that 4 components are sufficient.
##
## The root mean square of the residuals (RMSR) is  0.06
##  with the empirical chi square  1923.24  with prob <  3.8e-216
##
## Fit based upon off diagonal values = 0.98
```

```
round(fit.pc$values, 3)
```

```
##  [1] 13.288  5.697  2.835  1.981  1.649  1.235  0.978  0.672  0.461  0.403
## [11]  0.349  0.294  0.261  0.241  0.157  0.094  0.080  0.059  0.053  0.049
## [21]  0.031  0.030  0.027  0.024  0.018  0.015  0.008  0.007  0.002  0.001
## [31]  0.000
```

```
fit.pc$loadings
```

```
##
## Loadings:
##                    RC1    RC2    RC3    RC4
## id                  0.133
## radius_mean         0.951  0.131 -0.139
## texture_mean        0.252                0.909
## perimeter_mean      0.950  0.175 -0.107
## area_mean           0.967  0.101
## smoothness_mean     0.159  0.649  0.255 -0.187
## compactness_mean    0.459  0.771  0.320
## concavity_mean      0.659  0.606  0.311  0.102
## points_mean         0.798  0.508  0.149
## symmetry_mean       0.137  0.585  0.332
## dimension_mean     -0.314  0.660  0.532
## radius_se           0.832         0.395
## texture_se                -0.209  0.597  0.538
## perimeter_se        0.823         0.418
## area_se             0.876         0.262
## smoothness_se      -0.138         0.705
## compactness_se      0.204  0.514  0.667  0.111
## concavity_se        0.218  0.408  0.635
## points_se           0.426  0.328  0.638
## symmetry_se                       0.667
## dimension_se                0.384  0.751
## radius_worst        0.941  0.207 -0.164  0.131
## texture_worst       0.196  0.193         0.935
## perimeter_worst     0.937  0.253 -0.131  0.134
## area_worst          0.944  0.165 -0.118  0.120
## smoothness_worst            0.754
## compactness_worst   0.312  0.861         0.186
## concavity_worst     0.450  0.773  0.100  0.187
## points_worst        0.678  0.668         0.106
## symmetry_worst              0.717
## dimension_worst             0.880  0.181  0.104
##
##                    RC1   RC2   RC3   RC4
## SS loadings     10.151 7.037 4.361 2.252
## Proportion Var   0.327 0.227 0.141 0.073
## Cumulative Var   0.327 0.554 0.695 0.768
```

```
# Loadings with more digits
for (i in c(1,3,2,4)) { print(fit.pc$loadings[[1,i]])}
```

```
## [1] 0.1330256
## [1] 0.0991346
## [1] -0.09752479
## [1] 0.06781887
```

```
# Communalities
fit.pc$communality
```

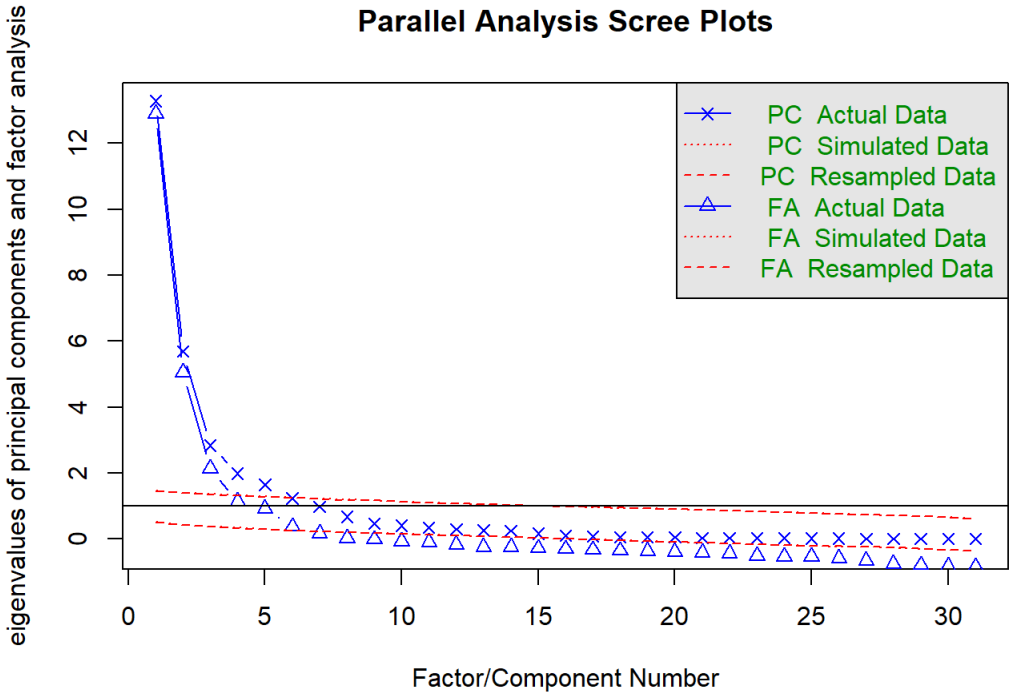
```
##                id       radius_mean      texture_mean    perimeter_mean
##        0.04163396        0.95069170        0.89684853        0.95431848
##         area_mean   smoothness_mean  compactness_mean    concavity_mean
##        0.96014950        0.54720158        0.90971908        0.90807129
##       points_mean     symmetry_mean    dimension_mean         radius_se
##        0.92076209        0.47390203        0.82580280        0.84993832
##        texture_se      perimeter_se           area_se     smoothness_se
##        0.69271471        0.85520824        0.83634402        0.51759585
##    compactness_se      concavity_se         points_se       symmetry_se
##        0.76240129        0.62241576        0.69650774        0.45095156
##      dimension_se      radius_worst     texture_worst   perimeter_worst
##        0.71272740        0.97219376        0.95565236        0.97796884
##        area_worst  smoothness_worst compactness_worst   concavity_worst
##        0.94731995        0.57201913        0.87681767        0.84471615
##      points_worst    symmetry_worst   dimension_worst
##        0.91825491        0.52608733        0.82467896
```

```
# Rotated factor scores, Notice the columns ordering: RC1, RC3, RC2 and RC4
head(fit.pc$scores)
```

```
##              RC1         RC2         RC3         RC4
## [1,] -0.3200066 -0.20898001 -0.25160464 -1.75616620
## [2,] -0.5649931 -0.22081178  0.85830109 -0.28887483
## [3,] -0.8242652 -0.03734588 -0.52158508 -0.09098986
## [4,] -0.3869942 -0.38180634  0.79329588 -1.49911551
## [5,]  0.1145874 -0.61206123 -0.91421184 -1.46638605
## [6,] -0.6900800 -0.15424020  0.07996063  0.35700314
```

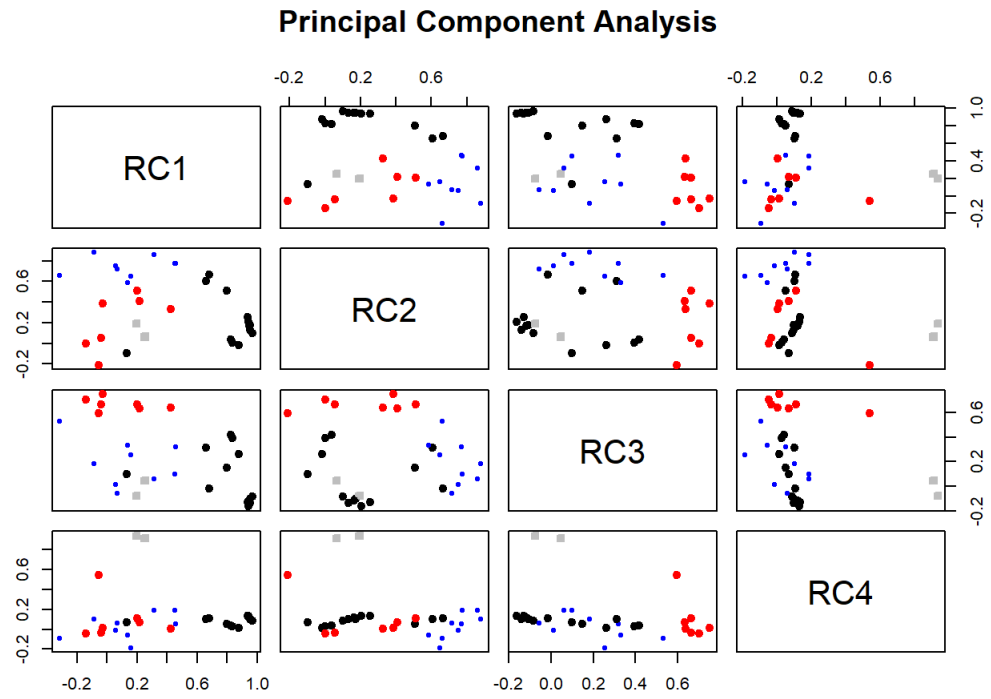
```
# Play with FA utilities

fa.parallel(cancer[-2]) # See factor recommendation
```

```
## Warning in fa.stats(r = r, f = f, phi = phi, n.obs = n.obs, np.obs
## = np.obs, : The estimated weights for the factor scores are probably
## incorrect. Try a different factor extraction method.
```




```
## Parallel analysis suggests that the number of factors =  6  and the number of components =  5
```

```
fa.plot(fit.pc) # See Correlations within Factors
```




```
fa.diagram(fit.pc) # Visualize the relationship
```