assignment_1.R

sissixuxu

Tue Jan 23 10:05:24 2018

```r
###Xu Xu
###Assignment 1
###1
#(a)
1:20
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
```

```r
#(b)
20:1
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

```r
#(c)
c(1:20,19:1)
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 19 18 17
## [24] 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

```r
#(d)
tmp <- c(4,6,3)
#(e)
rep(tmp,10)
```

```
##  [1] 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3
```

```r
#(f)
rep(tmp,l=31)
```

```
##  [1] 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4 6 3 4
```

```r
#(g)
rep(tmp,times=c(10,20,30))
```

```
##  [1] 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3
## [36] 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
```

```r
###2
tmp <- seq(3,6,by=0.1)
exp(tmp)*cos(tmp)
```

```
##  [1] -19.884531 -22.178753 -24.490697 -26.773182 -28.969238 -31.011186
##  [7] -32.819775 -34.303360 -35.357194 -35.862834 -35.687732 -34.685042
## [13] -32.693695 -29.538816 -25.032529 -18.975233 -11.157417  -1.362099
## [19]  10.632038  25.046705  42.099201  61.996630  84.929067 111.061586
## [25] 140.525075 173.405776 209.733494 249.468441 292.486707 338.564378
## [31] 387.360340
```

```r
###3
#(a)
(0.1^seq(3,36,by=3))*(0.2^seq(1,34,by=3))
```

```
##  [1] 2.000000e-04 1.600000e-09 1.280000e-14 1.024000e-19 8.192000e-25
```

```
##  [6] 6.553600e-30 5.242880e-35 4.194304e-40 3.355443e-45 2.684355e-50
## [11] 2.147484e-55 1.717987e-60
```

```
#(b)
(2^(1:25))/(1:25)
```

```
##  [1] 2.000000e+00 2.000000e+00 2.666667e+00 4.000000e+00 6.400000e+00
##  [6] 1.066667e+01 1.828571e+01 3.200000e+01 5.688889e+01 1.024000e+02
## [11] 1.861818e+02 3.413333e+02 6.301538e+02 1.170286e+03 2.184533e+03
## [16] 4.096000e+03 7.710118e+03 1.456356e+04 2.759411e+04 5.242880e+04
## [21] 9.986438e+04 1.906502e+05 3.647221e+05 6.990507e+05 1.342177e+06
```

```
###4
#(a)
tmp <- 10:100
sum(tmp^3+4*tmp^2)
```

```
## [1] 26852735
```

```
#(b)
tmp <- 1:25
sum((2^tmp)/tmp + 3^tmp/(tmp^2))
```

```
## [1] 2129170437
```

```
###5
#(a)
paste("label", 1:30,sep=" ")
```

```
##  [1] "label 1"  "label 2"  "label 3"  "label 4"  "label 5"  "label 6"
##  [7] "label 7"  "label 8"  "label 9"  "label 10" "label 11" "label 12"
## [13] "label 13" "label 14" "label 15" "label 16" "label 17" "label 18"
## [19] "label 19" "label 20" "label 21" "label 22" "label 23" "label 24"
## [25] "label 25" "label 26" "label 27" "label 28" "label 29" "label 30"
```

```
#(b)
paste("fn", 1:30,sep="")
```

```
##  [1] "fn1"  "fn2"  "fn3"  "fn4"  "fn5"  "fn6"  "fn7"  "fn8"  "fn9"  "fn10"
## [11] "fn11" "fn12" "fn13" "fn14" "fn15" "fn16" "fn17" "fn18" "fn19" "fn20"
## [21] "fn21" "fn22" "fn23" "fn24" "fn25" "fn26" "fn27" "fn28" "fn29" "fn30"
```

```
###6
set.seed(50)
xVec <- sample(0:999, 250, replace=T)
yVec <- sample(0:999, 250, replace=T)
#(a)
yVec[-1] - xVec[-length(xVec)]
```

```
##   [1]  163 -122  317 -146  417  393  249 -489  741  771   81  402 -549  338
##  [15]  583 -403  -67  217  307 -121 -269   36 -706 -563  102   48  397  297
##  [29]  -45 -152  497  405  339 -400  499  -89  211 -670   87   74  554  149
##  [43] -183  612  193 -453  -70 -141  127 -709 -708 -722  -64  388 -184 -212
##  [57]  242  430  275  672 -150  275  -96 -255  512  577  264  439  149 -916
##  [71]  374 -889 -332  324 -553  394  -87  -75  345 -735  -55  100  -40   15
##  [85]  279  409  790 -547 -487 -399 -619 -168 -185   19  645  551  227 -366
##  [99]  242  147  247 -499 -614  758   63 -227  247  379 -472  566 -762  152
## [113]  493  360   69  190  544 -176  216 -676 -205  782 -109  189 -233  505
## [127] -219  288  -57  487  256  300 -192 -263  704  674  217  280   17  -68
```

```
## [141]   259   612  -127     1   545  -231  -191  -338   333   495   -21    -4   294  -668
## [155]  -814   420   793   631   -67   655   143   611  -220  -518  -285   327   523   -13
## [169]  -679  -241    39   193   342   588   469    68   895  -658   232  -331    27   441
## [183]  -733  -182  -399    79  -469   371   475   265  -407   211    59  -974   -90   218
## [197]   396  -486  -963  -327   425   220   128   235   294  -107  -365   146  -588   449
## [211]  -434   221   846   386  -910   161   206   109   712  -334  -434     7   640  -350
## [225]   923   353  -579   225   327   410   568  -195   -83   154  -486  -195   667  -144
## [239]   272   410   546   380  -559   414   674   193   222   -92   553
```

```r
sin(yVec[-length(yVec)]) / cos(xVec[-1])
```

```
##   [1]    0.88603405  -1.44184825    0.82807258  -1.61591717  -0.86017343
##   [6]   20.26356465  -0.79930406    1.72414444  -0.08094240  -0.74895634
##  [11]   -2.59866958  -0.37361045   31.11471579   0.12355916  -0.35925226
##  [16]   -0.90743608   0.34374436    5.78205917  -2.57418558  -0.78661325
##  [21]   -0.59855406   0.98936263    0.33042931  -1.75124647  -0.59435547
##  [26]    1.05374692   0.65497397   -0.11596582  -0.97176537   0.57180267
##  [31]    0.75799030  -0.49259143   -0.99433357   0.05377148  -3.77616264
##  [36]   20.54902944   0.77784817    1.28146891  -0.51650728   6.66902699
##  [41]   -0.92970072 -10.93066299   -3.13102962  30.87943423  -1.14281543
##  [46]    0.36757630   1.18479716    0.94594159   0.93339520   0.93632658
##  [51]  -11.05384468   2.76893270    0.97488334  -0.08932225  -1.33616578
##  [56]   -3.30065552   0.62663162   -1.96486337   0.08653876   0.56695489
##  [61]   44.07630714  -1.11764853    0.11230330  -0.46073106  -0.13860882
##  [66]    0.84026052   2.64708780   -1.63174570  -9.63022830  -2.15553419
##  [71]   -0.42770826   3.24955062   -4.23453154   0.93067452  -0.88388390
##  [76]    0.69339350   1.72841015   -8.22082884   1.69276461   1.02074555
##  [81]   -3.21968328  -0.90739226    1.11331935   0.59579467   0.19571363
##  [86]   -0.17975474   4.38929818    0.64431266  -1.54509170  -0.26536991
##  [91]   -0.81679156   1.34164181   -1.03400420  -1.33639979  -0.44444499
##  [96]    0.96777754  -0.09545121   -0.63686070  -2.30844090  -0.11384497
## [101]    1.08800453   1.06851885   -0.30428029  -1.77044888  -1.45269351
## [106]    0.97943716  -2.15021752    1.56128032   0.61018741   5.59692239
## [111]   -1.03020002  -1.14632240   -0.81548097   0.95359082  74.12815803
## [116]   -0.20329495  -0.08875385   -0.76023984  -0.42372635  -0.68385723
## [121]    1.28860542   0.94117702    1.89561343   0.69369539   4.15021756
## [126]   -1.08026240   1.26615554    0.02147428   3.32694398   0.22930300
## [131]    1.14217476   0.73847767    8.72339712 -17.15727240   0.90435970
## [136]    1.07791792   0.75391899   -0.26297571   0.83894657  -1.22542984
## [141]   -0.57277292  -1.22429033    2.10719833  -1.35745285  -0.84117115
## [146]   -0.69663176  -0.99207337   -1.17363312  -5.50814669  -1.12309426
## [151]    0.60767585   0.32903697   -0.08845387  -4.42251048  -1.31360561
## [156]   -1.05268827  -1.45007537   -1.03184453   0.38034305   2.06381128
## [161]   -1.64568068   0.47938401   46.18666528   1.75988821  14.03349520
## [166]    1.99884446  -1.02170635    1.02445028  -0.15250370  -1.11793279
## [171]   -4.12228606   1.02355677    0.89546497   0.74732250  -2.09533197
## [176]   -2.40630344  -0.73530615    0.90759126  -0.87474163  -4.22536917
## [181]   -2.04450866  -7.41320483    0.03607946  -0.85674969  -0.85648584
## [186]    2.58973778   8.68248704   -0.74202802   1.07347586   1.37638585
## [191]    1.73104746  -0.57596355   -0.49915725   0.11786229  -0.45584137
## [196]   -0.97726281  -6.86428063   -0.60929448  -0.72132361   0.00000000
## [201]    1.00734878   4.20789995   -0.81616263  -1.72455176  10.00784534
## [206]    0.71310632   8.77005056   -0.64297796   0.24086573  -6.12424634
## [211]    0.94848253   9.22132979   -5.85933168  -0.77292827  -0.85749485
```

```
## [216]    0.80000340 -10.45187777    2.91489552    0.86914823    0.93956496
## [221]    1.15020196  -4.25009579  -0.97278301    1.05669698  23.96919924
## [226]   -0.11659711    0.58615433  -1.23512544    1.08111948    3.37846777
## [231]    0.96204558  -1.18727215    0.77801767    2.39161655    1.01270315
## [236]    0.30508064  -1.13987140    1.35085069    2.13213714    0.95034702
## [241]    0.48941676  -1.03804260    1.11768517  -0.25446052 -15.07630921
## [246]    1.12429826    0.28067653  -0.75125301  -1.91160477
```

```r
#(c)
xVec[-c(249,250)] + 2*xVec[-c(1,250)]-xVec[-c(1,2)]
```

```
##    [1] 1382    70 1221 1749  -98  796 1949  623 -134  618  288 1472  517  -45
##   [15]  794 1982 1489  344 -206 1207  292  771 2085  810 1032 1547  767  537
##   [29]  702  676  737  664 1451  435 1355  168 1150  989  926  348 1757 1299
##   [43]  409 -497  501 2150 1157 1081 1323 2030 1887 1744  879  590  493 1330
##   [57] 1254 1281  465  767 1691  464 1238  805 -519 1425  710 -611 1517  963
##   [71] 1836 2243 -158 1860  606  506 1917 1304 2021 2025  238  226  733 1538
##   [85]  581 -659  824 1109 1136 1339 1239 1584 2300  562  567 -375 1372  761
##   [99] 1142  714 1801 2220  624 -806 1738  268  398 1941  668 2037  829  345
##  [113]  337  -45  635 -285 1225  691 1792 2216  123  538 1130 1124 1172  944
##  [127]  271  -62  229  785  -70 1346 1622  381  104 1036 1015  199  589 1399
##  [141]  601  506  560 -145  171 1204 1427 1278 1128  615  269   37 1521 2172
##  [155] 1602  464   74 1575  599   88 -267 1185 1655 1564 1420  880  229 1651
##  [169]  959 1306 2008 1243  267 1110  556 -791 1300  844 1578 2427  708 1554
##  [183] 1439 1150 1269 2274 1419 1067  187 2071  781 -148 1767 1851 1019 -196
##  [197]  554 2223 1710  -90  788 1209  876 1322  275 1191  323 1570 1234  768
##  [211] 1715  903 -768 1546 1452  -47 1125 -330  871 2463  894  133  975  201
##  [225] -137 1553  299  865  746  184  267  839  -63  863 2411  133 1739 1145
##  [239] 1015   47  209 1468  846   10 1146   31 1405 1058
```

```r
#(d)
sum(exp(-xVec[-1])/(xVec[-length(xVec)]+10))
```

```
## [1] 0.01269872
```

7

```r
#(a)
yVec[yVec>600]
```

```
##    [1] 709 871 621 930 948 783 878 671 860 768 698 974 855 813 776 721 917
##   [18] 985 705 884 840 687 957 955 786 938 930 641 615 988 881 881 997 823
##   [35] 791 643 779 693 845 815 752 766 635 993 919 686 635 613 660 800 743
##   [52] 965 743 615 615 803 948 760 604 800 772 863 902 689 881 941 924 693
##   [69] 835 632 872 876 850 961 681 791 947 915 712 665 921 798 866 828 942
##   [86] 841 645 681 827 884 890 970 632 717 846 952 609 824 695 675 777 813
##  [103] 792 783 611 853 738 668 791
```

```r
#(b)
(1:length(yVec))[yVec>600]
```

```
##    [1]   1   2   5   6   8  10  11  13  16  18  27  28  32  33  34  36  42
##   [18]  43  45  48  50  55  58  59  60  61  63  66  67  68  72  79  80  86
##   [35]  88  94  95  96  97 101 102 105 107 109 111 114 118 119 120 123 125
##   [52] 127 131 132 134 136 137 138 139 142 143 150 151 154 157 158 159 161
##   [69] 163 164 167 168 172 173 174 175 176 178 180 181 182 183 187 189 190
##   [86] 203 204 205 206 211 213 214 219 220 224 226 227 230 232 237 238 239
##  [103] 241 243 245 246 247 249 250
```

```
#(c)
xVec[yVec>600]
```

```
##    [1] 708 437 513  44 646 107 390 640 676 364 577 257 408 437 618 627 836
##   [18] 278  55 458 803 358 525 511 266 578 197  38 724  61 995 652 956  19
##   [35] 680 760  48 294  69 505 964  24  10 840 878 113 789 444 986 537 515
##   [52] 263 359 189 457 274 543 324 176 160 260 407 216 977 148 293 660 137
##   [69] 852 743 353 371 768 339 203 478  49 880 996 894 357 900 972 467 324
##   [86] 517 446 533 190 501 124  14   5 863 399 256 678 188 258 110 957 285
##  [103]  34 631 179 545 123 238 178
```

```
#(d)
sqrt(abs(xVec-mean(xVec)))
```

```
##    [1] 16.0044994  3.8543482 15.8699716 17.7522956  7.8194629 20.1954450
##    [7] 15.7208142 13.9335566 20.2449006 18.5702989  7.8648585 13.5224258
##   [13] 13.7165593 19.3611983 13.2233127 14.9714395 19.5740645  9.3731532
##   [19] 19.4385185 16.8480266 12.8118695 16.0890025 16.0668603 19.7520632
##   [25] 11.9522383 14.0763632 11.1867779 13.9590831 11.3073427  9.1572922
##   [31]  9.6879306  6.6223863  3.8543482 12.8896858 15.1610026 13.2341981
##   [37] 18.1894475 15.7842960  8.8800901  2.4787093  9.4263461 19.5995918
##   [43] 13.1854465 18.9434949 19.9212449 15.7525871 22.4085698  2.4787093
##   [49] 16.1599505 18.7388367 23.3268943 17.6958752 13.6800585 12.3634947
##   [55]  9.6879306  5.1822775 16.2217138  8.5524266  7.6905136 13.6329014
##   [61] 11.2313846 14.2528594 15.9642100 11.5388041 17.9681941 20.3434510
##   [67] 16.4967876 19.7700784 17.7723381 22.1843188  7.4259006 23.3054500
##   [73] 14.4618118 19.4385185 22.6967839 17.4314658 14.3228489 22.4531512
##   [79] 14.1472259 22.4531512  9.5469367 20.8532012 10.6233705  4.1405314
##   [85]  9.5991666 20.8051917 21.2333700 15.1044364  9.2273506 13.8976257
##   [91] 15.4642814 15.3669776 19.3944322 17.5540309 20.0961688 12.5640758
##   [97] 19.5667064 18.8452647 11.8682770 14.7018366  7.2899931 22.6305988
##  [103] 13.4217734 21.0678903 20.6846803 20.2520122 21.0203711 12.7335777
##  [109] 19.7013705  9.9426355 20.6432556 19.4898948 16.0890025 18.4080417
##  [115] 19.2316406 11.3954377 18.9962101 18.3614814  2.8028557 23.1115556
##  [121] 13.1203658 20.8292103  9.2273506 10.1066315  7.9463199  2.8537694
##  [127] 13.7424889 20.2449006 19.3870060 13.9948562  9.6361818 16.2128344
##  [133] 18.8452647  2.2680388 18.7844617 13.3362663  9.5469367 11.3073427
##  [139] 16.6089133  5.0143793  9.4416100 17.0837935 13.8512093 16.6690132
##  [145] 20.0961688  6.0709143 15.9732276 13.1584194  8.8399095  6.6974622
##  [151] 15.3576040 15.0948998  7.5402918 22.9160206 19.3944322  3.0239048
##  [157] 17.4314658 12.6038089 14.4271965 20.3434510 17.7441821 15.0948998
##  [163] 20.0035997 17.0629423 15.2034207  9.6511139  9.9426355  8.9919964
##  [169] 20.3505282  0.3794733 18.9510950 17.7804387 10.6233705 15.7751704
##  [175]  5.1131204 20.0712730 20.7811453 20.6916408  5.3050919 23.3268943
##  [181] 21.0272205  9.7394045 21.1694119 12.2940636 14.6677878 18.3069386
##  [187] 22.8066657  2.2680388  3.8915293 11.3073427 21.8207241 18.5163711
##  [193]  9.3196566 23.1331796 10.9610219 13.1093860 18.4080417 15.8159413
##  [199] 22.6084940  6.8451443 19.7194320 13.0055373  8.0711833  2.4199174
##  [205]  9.0079964 16.1819653 13.6434600 13.2987217 20.3259440  4.1056059
##  [211]  7.0102782 14.7358067 18.1067943 20.9250090 21.6366356 11.9939985
##  [217] 19.1795725  8.4346903 21.1389688 20.2766861 20.2025741 18.2169152
##  [223] 15.6797959  7.2702132 20.5634627 13.9948562 15.0380850 19.8205953
##  [229]  6.7189285 16.2436449 18.0237621 13.9232180  8.7095350 16.7587589
##  [235] 18.1423262 20.4485696 18.4893483 22.4754088 12.9172753  8.3579902
```

```
## [241] 20.4415264  6.9897067 13.3844686 15.9642100 16.5183534  9.6511139
## [247] 18.1343872 17.5540309 14.6238162 16.5485951
```

```
#(e)
sum(yVec>max(yVec)-200)
```

```
## [1] 57
```

```
#(f)
sum(xVec%%2==0)
```

```
## [1] 124
```

```
#(g)
xVec[order(yVec)]
```

```
##   [1] 405 842 308 572 461   8 256 507 373 639  42 616  29 645 376 669 688
##  [18] 197  63 638 862  77 996  93  59 585 661  72 339  20 206 537 174 322
##  [35]  42 603 425  48 707 452 477  99 224 811 715 358 963 222 395 543 480
##  [52] 193 683 710 691 954 700 614 787 835 275 435 309 368 224 460 497 944
##  [69] 530 765 523 171 870 807 469 828 624 200 713 365 781  74 129  76 701
##  [86] 760 193 866 353 168 967 545 920 541 650 148 277  18 667 865 987 120
## [103] 655   1 554 699 311 458 632  84 269  82 280 544  17 621 807 113 136
## [120] 457 702  91 625 767 828 109 860 363 121 657 668 324 382 956 299 403
## [137]  74 928 415  38 127 176 678 179 444 724 189 457 513 743   5  10 789
## [154]  38 760 446 986 894 238 640 110 203 533 113 358 977 294 137 258 577
## [171]  55 708 996 863 627 123 515 359 964 324  24 364 260 618 957  48 107
## [188] 631 266 680 478 178  34 900 537 160 274 437 285 505  19 188 190 467
## [205] 852 803 517  69 399 768 545 408 676 407 972 437 353 371 390 995 652
## [222] 148 458 501 124 216 880 836 878 357 660  44 197 578 293 324  49 646
## [239] 543 256 511 525 339 263  14 257 278  61 840 956
```

```
#(h)
yVec[seq(1,250,3)]
```

```
##   [1] 709 517 437 783 671 860 581 347 279 974 216 776 538 460 985 248 317
##  [18] 288 687 957 938 101 615 285 106 414 881 488 484 791 246 643 845 553
##  [35] 465  87 993 116 473 635 310 428 965  19 489 803 604 800 175 516 902
##  [52] 689 881 593 835 398 358 850 791 915 665 167 866 942 320 482 216 488
##  [69] 681 273 884 970 469 717 127 952 284 695 325 777 792  72 738 791
```

```
###8
1+sum(cumprod(seq(2,38,b=2)/seq(3,39,b=2)))
```

```
## [1] 6.976346
```