Topic2_MY-OWN-Rcode.R

dcsil

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```r
##TOPIC 2 MY OWN WORKING SPACE LOL


library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.3.2
```

```
## -- Attaching core tidyverse packages ----------------------- tidyverse 2.0.0 --
## v dplyr     1.1.2      v readr     2.1.4
## v forcats   1.0.0      v stringr   1.5.0
## v ggplot2   3.4.4      v tibble    3.2.1
## v lubridate 1.9.2      v tidyr     1.3.0
## v purrr     1.0.2
## -- Conflicts ------------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```r
library(dplyr)

setwd("~/GitHub/DSA1101 Slayers")
sales <- read.csv("~/GitHub/DSA1101 Slayers/datasets/yearly_sales.csv") #OK YAY THIS WORKS even if its
head(sales)
```

```
##   cust_id sales_total num_of_orders gender
## 1  100001      800.64             3      F
## 2  100002      217.53             3      F
## 3  100003       74.58             2      M
## 4  100004      498.60             3      M
## 5  100005      723.11             4      F
## 6  100006       69.43             2      F
```

```r
#focusing on sales total

total = sales$sales_total

#summary of the center: mean, median, mode
n = length(total) #sample size
summary(total)
```

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    30.02   80.29  151.65  249.46  295.50 7606.09
```

```r
#summary of the variability
range(total) #returns min and max values, on the same line
```

```
## [1]   30.02 7606.09
```

```r
#ie [1]   30.02 7606.09

var(total) #returns variance
```

```
## [1] 101793.4
```

```r
#measures how far a set of numbers are spread out from their average

sd(total) #returns standard deviation
```

```
## [1] 319.0508
```

```r
#measures spread of data too-- literally this is the sqr root of variance

#so Variance = SD**2

IQR(total) #Inter QUARTILE range
```

```
## [1] 215.21
```

```r
#u chop the data into 4 parts, and take the middle 2 parts


#Inferences from numerical summaries:

#1) if the mean is the same as the median, the sample is close to symmetrical
#2) mean is sensitive to outliers, median is not
#3) mean > median == sample is right skewed
#   mean < meidan == sample is left skewed

hist(total, freq = FALSE, main = paste("Histogram of total sales"),
     xlab = "total",
     ylab = "Frequency",
     col = "blue",
     ylim = c(0, 0.0045))
lines(density(total), col = "red")
```

Histogram of total sales
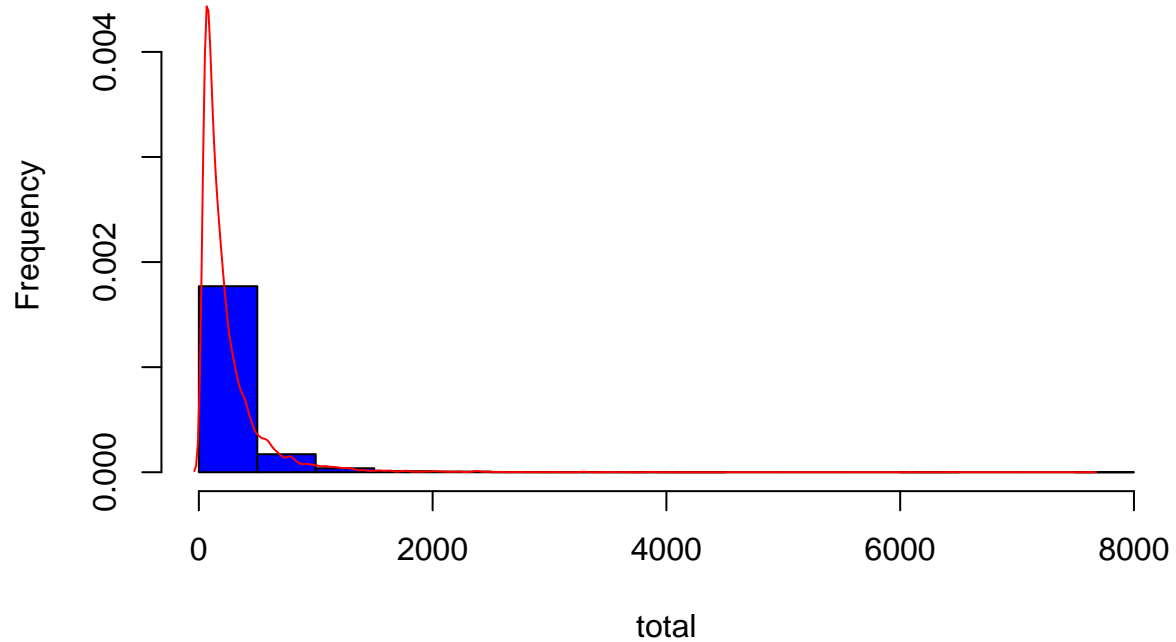

```r
#for left skewed histograms, the left tail is longer than the right tail
#ie theres more values on the left edge than the right edge, some vid said the left side looks more squ

#vice versa for right skew

qqnorm(total, main = "QQ Plot", pch = 20)
qqline(total, col = "red") #this makes the x=y line
```

QQ Plot
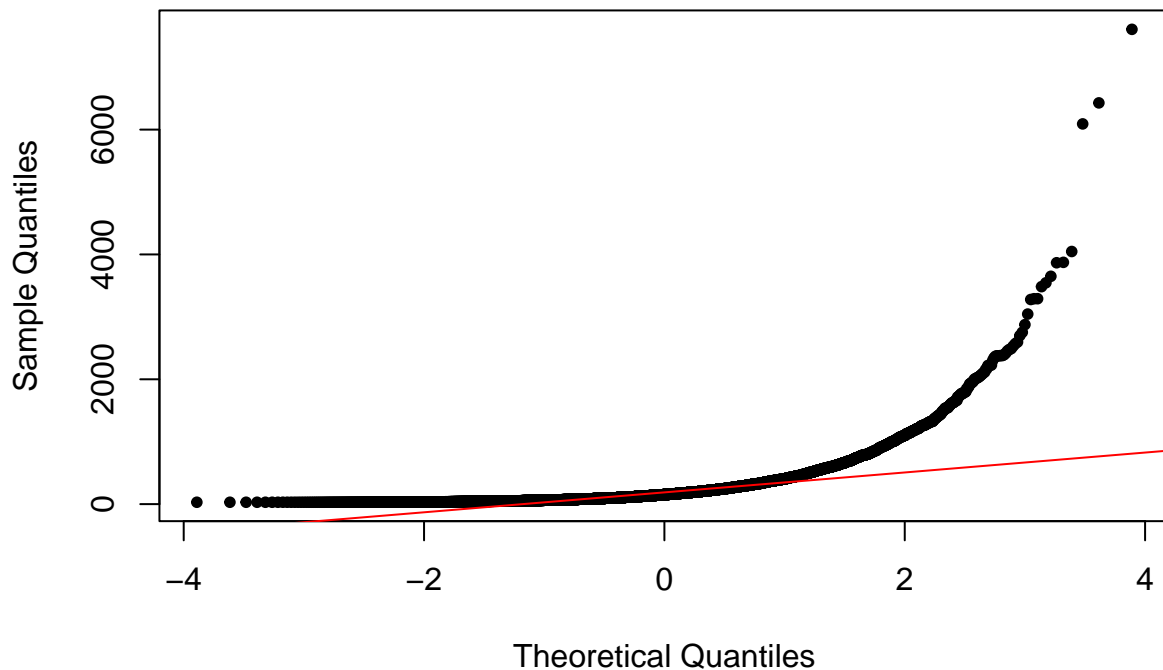

```r
order = sales$num_of_orders
cor(total, order)
```

```
## [1] 0.7508015
```

```r
#for correlation value r,
#positive value -> positive association
#negative value -> negative association
#closer ther absolute value of r to 1-> stronger association between X and Y

#From lecture
#a = round(variable, didgits = 2)
#others used: total, length, summary, be clear on hist parameters

# HISTOGRAM WITH NORMAL DENSITY
hist(total, freq=FALSE, main = paste("Histogram of Total Sales"),
     xlab = "total sales", ylab="Probability",
     col = "grey", ylim = c(0, 0.002))
x <- seq(0, max(total)) #she literally said "if u no stats bg i cannot help u, just follow"
y <- dnorm(x, mean(total), sd(total))
lines(x, y, col = "red") # this is the normal density curve
```

Histogram of Total Sales
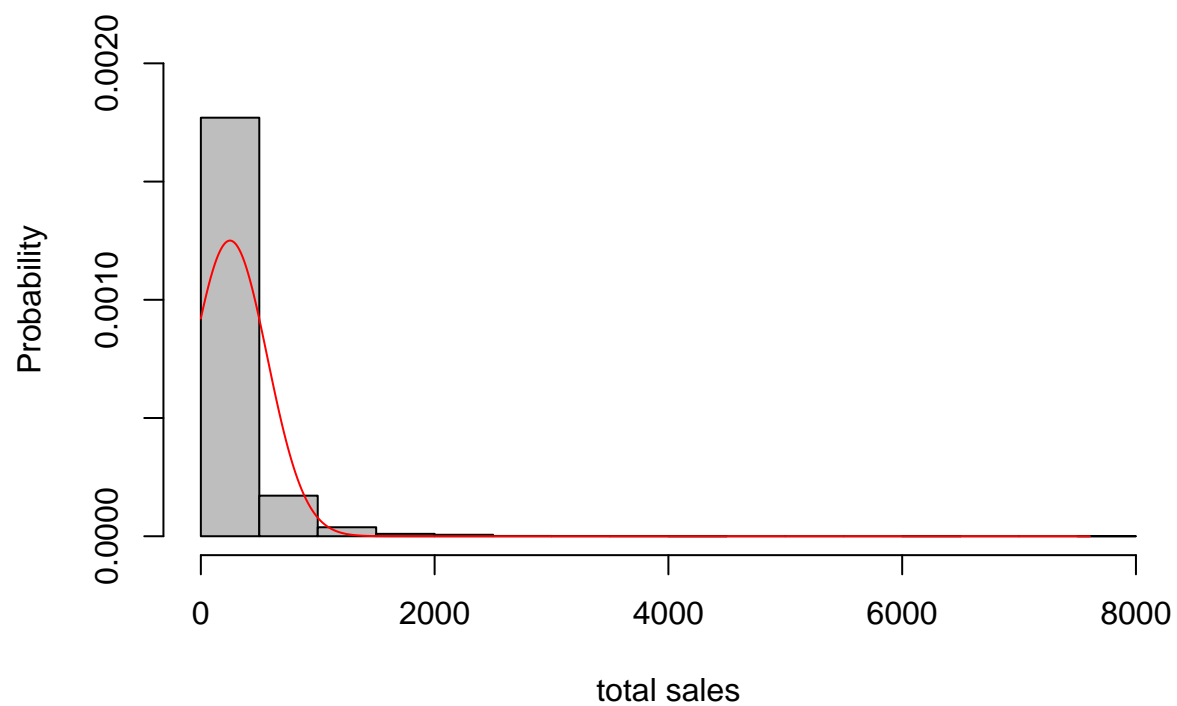

```
outlier = boxplot(total)$out
```
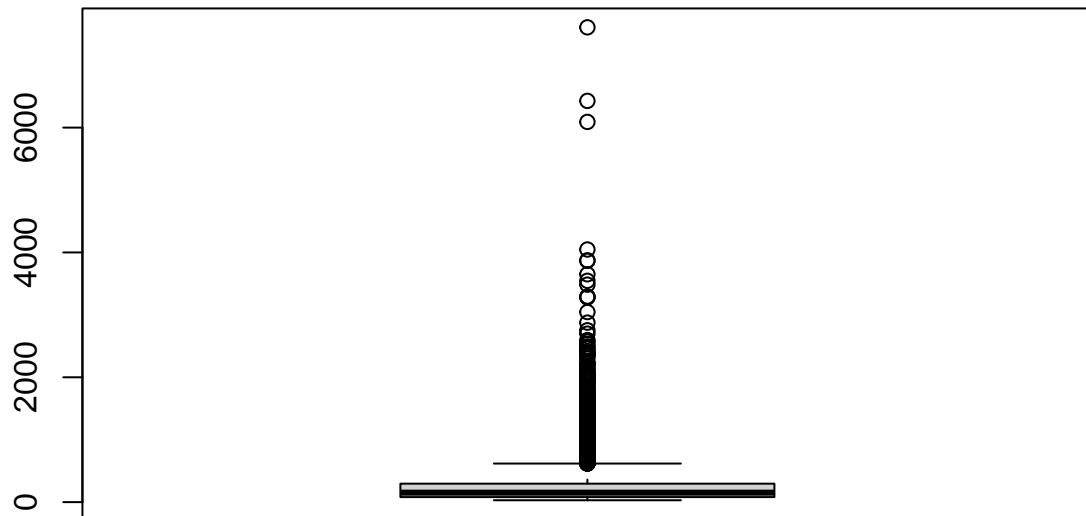
```r
length(outlier)
```

```
## [1] 772
```

```r
total[9816]
```

```
## [1] 6091.15
```

```r
index = which(total %in% outlier)
index
```

```
##   [1]    1    5   14   36   57   77  102  117  124  133  136  150  159  162  176
##  [16]  183  215  220  228  253  260  272  290  293  315  322  329  337  344  354
##  [31]  359  377  379  390  402  407  426  429  454  459  480  493  497  519  528
##  [46]  530  538  549  557  564  580  581  588  594  599  609  613  620  634  635
##  [61]  642  644  652  662  685  695  696  721  733  778  782  789  805  830  834
##  [76]  840  856  862  866  874  885  887  888  891  897  900  941  943  962  972
##  [91]  989  993 1026 1051 1066 1073 1084 1085 1099 1114 1143 1177 1178 1190 1198
## [106] 1205 1218 1224 1235 1236 1238 1241 1242 1247 1253 1302 1324 1325 1334 1343
## [121] 1367 1369 1400 1404 1411 1420 1437 1451 1455 1500 1507 1509 1552 1561 1578
## [136] 1580 1605 1608 1609 1613 1614 1619 1623 1626 1633 1636 1657 1676 1703 1735
## [151] 1738 1742 1749 1758 1759 1767 1785 1795 1801 1825 1832 1838 1842 1851 1865
## [166] 1879 1889 1900 1905 1933 1996 2002 2005 2015 2029 2080 2093 2114 2146 2189
## [181] 2199 2203 2216 2226 2230 2231 2248 2256 2278 2320 2347 2358 2362 2369 2378
```

```
## [196] 2379 2383 2386 2394 2397 2399 2405 2412 2419 2422 2438 2453 2456 2464 2468
## [211] 2478 2525 2540 2541 2543 2547 2555 2592 2630 2641 2644 2652 2663 2666 2692
## [226] 2704 2707 2747 2750 2751 2810 2818 2826 2830 2836 2869 2875 2877 2886 2893
## [241] 2897 2919 2922 2923 2936 2953 2965 2975 3009 3014 3021 3026 3030 3039 3050
## [256] 3075 3083 3088 3128 3147 3176 3178 3190 3193 3194 3232 3250 3266 3268 3278
## [271] 3291 3317 3319 3320 3329 3335 3339 3366 3371 3385 3395 3415 3438 3463 3469
## [286] 3479 3496 3504 3517 3521 3559 3577 3579 3612 3638 3661 3672 3676 3684 3687
## [301] 3690 3699 3718 3731 3735 3739 3757 3770 3780 3788 3791 3793 3797 3815 3830
## [316] 3851 3866 3872 3895 3939 3977 3989 3999 4012 4015 4021 4032 4042 4079 4081
## [331] 4083 4084 4099 4128 4175 4184 4192 4193 4217 4237 4256 4263 4268 4270 4272
## [346] 4276 4284 4289 4335 4362 4401 4402 4416 4418 4461 4485 4489 4491 4516 4521
## [361] 4526 4568 4607 4630 4640 4647 4683 4687 4692 4711 4715 4733 4742 4792 4798
## [376] 4801 4808 4835 4837 4851 4856 4865 4883 4892 4893 4895 4918 4938 4961 4970
## [391] 4987 4996 4997 5026 5027 5032 5051 5055 5092 5156 5179 5221 5254 5257 5260
## [406] 5264 5298 5315 5318 5364 5368 5373 5399 5400 5430 5437 5439 5478 5482 5483
## [421] 5486 5493 5497 5498 5502 5508 5509 5528 5554 5588 5620 5648 5670 5715 5718
## [436] 5723 5726 5729 5753 5760 5770 5774 5777 5796 5802 5818 5825 5828 5831 5837
## [451] 5839 5840 5868 5876 5877 5894 5912 5936 5947 5949 5952 5954 5955 5962 5974
## [466] 5992 5997 6014 6030 6048 6077 6119 6120 6124 6135 6158 6177 6188 6204 6223
## [481] 6234 6246 6252 6261 6283 6288 6301 6309 6371 6378 6380 6401 6404 6426 6428
## [496] 6438 6445 6467 6472 6481 6486 6508 6520 6537 6538 6544 6551 6590 6605 6611
## [511] 6616 6626 6653 6658 6675 6694 6706 6724 6725 6737 6739 6745 6760 6761 6766
## [526] 6769 6776 6785 6804 6817 6821 6839 6840 6857 6867 6876 6886 6889 6915 6928
## [541] 6945 6954 6964 6972 6983 7002 7028 7039 7045 7047 7051 7054 7083 7108 7116
## [556] 7118 7120 7133 7137 7142 7174 7188 7191 7204 7216 7221 7274 7281 7286 7289
## [571] 7292 7295 7352 7414 7452 7455 7466 7467 7475 7485 7511 7512 7547 7552 7577
## [586] 7590 7600 7613 7627 7638 7646 7654 7670 7683 7684 7728 7745 7764 7768 7789
## [601] 7792 7805 7826 7833 7834 7836 7841 7859 7870 7871 7874 7875 7882 7917 7925
## [616] 7988 8012 8107 8117 8128 8135 8139 8141 8151 8159 8175 8176 8178 8192 8198
## [631] 8202 8220 8223 8228 8233 8238 8250 8255 8268 8277 8278 8283 8300 8302 8336
## [646] 8344 8367 8374 8402 8405 8407 8419 8442 8449 8470 8471 8476 8480 8508 8509
## [661] 8520 8523 8551 8567 8571 8574 8578 8583 8588 8591 8593 8607 8615 8619 8623
## [676] 8642 8656 8667 8702 8764 8767 8791 8797 8820 8847 8853 8886 8890 8894 8898
## [691] 8925 8938 8941 8954 8976 8982 8991 8998 9031 9041 9069 9079 9088 9103 9110
## [706] 9129 9155 9157 9161 9166 9170 9184 9192 9193 9200 9201 9215 9267 9278 9330
## [721] 9333 9334 9336 9342 9352 9377 9407 9429 9480 9507 9556 9560 9571 9594 9626
## [736] 9631 9633 9637 9641 9643 9645 9647 9670 9715 9716 9724 9767 9775 9781 9785
## [751] 9796 9803 9815 9816 9820 9827 9845 9846 9863 9879 9881 9892 9893 9897 9903
## [766] 9913 9915 9946 9984 9987 9988 9990
```

```
sales[c(index),]
```

```
##      cust_id sales_total num_of_orders gender
## 1     100001      800.64             3      F
## 5     100005      723.11             4      F
## 14    100014     1044.40             7      M
## 36    100036      710.93             4      M
## 57    100057      659.04             3      M
## 77    100077      920.85             5      F
## 102   100102      742.42             6      F
## 117   100117      650.47             2      F
## 124   100124      818.45             6      F
## 133   100133      747.90             4      M
## 136   100136      989.62             6      M
```

```
## 150    100150    1011.88           9        F
## 159    100159    1947.93           9        M
## 162    100162     782.29           2        M
## 176    100176     680.61           6        F
## 183    100183    1210.78           5        F
## 215    100215    1211.36           7        M
## 220    100220    1247.34           5        M
## 228    100228     874.14           2        M
## 253    100253    2301.26           9        F
## 260    100260    3873.24           8        F
## 272    100272    1036.88          10        F
## 290    100290    1166.18           7        F
## 293    100293     852.60           6        F
## 315    100315    1848.53           5        M
## 322    100322     683.87           3        F
## 329    100329    1184.36           8        M
## 337    100337    1641.18           7        F
## 344    100344     790.95           3        F
## 354    100354     829.69           6        M
## 359    100359     638.93           6        M
## 377    100377     902.32           5        M
## 379    100379     729.94           5        F
## 390    100390     646.95           4        F
## 402    100402    1160.46           7        F
## 407    100407     793.39           5        F
## 426    100426     838.00           5        F
## 429    100429     965.25           4        M
## 454    100454    2016.62          12        F
## 459    100459    1133.40           8        F
## 480    100480     663.84           3        F
## 493    100493    1406.28          10        M
## 497    100497    1082.74           9        M
## 519    100519     667.34           3        M
## 528    100528     797.73           3        M
## 530    100530     883.65           6        M
## 538    100538     982.78           2        M
## 549    100549     862.94           3        M
## 557    100557     790.77           5        M
## 564    100564     942.67           5        F
## 580    100580     621.54           4        F
## 581    100581     963.15           5        M
## 588    100588     873.21           6        M
## 594    100594     701.36           4        F
## 599    100599     783.15           3        M
## 609    100609    1086.80           5        F
## 613    100613     626.92           4        M
## 620    100620     860.13           3        M
## 634    100634     700.97           5        M
## 635    100635     945.51           3        F
## 642    100642     806.59           6        M
## 644    100644     935.42           3        F
## 652    100652     719.27           4        F
## 662    100662     631.37           3        M
## 685    100685     619.89           4        F
```

```
## 695   100695    653.24           3       F
## 696   100696    884.12           2       M
## 721   100721   1568.75           9       M
## 733   100733    746.41           5       F
## 778   100778    962.84           3       M
## 782   100782   2393.59           8       F
## 789   100789    627.31           5       M
## 805   100805    643.36           5       M
## 830   100830   1308.77           6       F
## 834   100834    921.29           2       F
## 840   100840    946.92           6       M
## 856   100856   1170.98           5       M
## 862   100862   1320.80           8       F
## 866   100866    996.59           5       M
## 874   100874   1048.72           5       F
## 885   100885   3649.93          10       F
## 887   100887   1253.28          10       M
## 888   100888    768.22           5       F
## 891   100891    903.43           6       F
## 897   100897   1442.13           7       M
## 900   100900   1516.49           6       F
## 941   100941    909.40           3       M
## 943   100943   1770.28           9       M
## 962   100962    840.26           6       M
## 972   100972    783.78           5       F
## 989   100989    713.59           4       F
## 993   100993   1020.63           8       M
## 1026  101026    788.49           3       M
## 1051  101051    660.55           4       M
## 1066  101066   1778.48           9       F
## 1073  101073    653.94           3       F
## 1084  101084    789.02           5       F
## 1085  101085    666.00           3       F
## 1099  101099    803.16           3       M
## 1114  101114    977.00           4       M
## 1143  101143   2115.19           5       F
## 1177  101177    880.21           6       M
## 1178  101178   1062.55           5       M
## 1190  101190    798.61           4       F
## 1198  101198    639.57           5       F
## 1205  101205    694.78           5       F
## 1218  101218    723.43           2       M
## 1224  101224   1851.20           8       M
## 1235  101235    692.51           5       M
## 1236  101236   1312.78           5       M
## 1238  101238   2030.63          11       M
## 1241  101241    631.41           2       M
## 1242  101242   1872.14           5       F
## 1247  101247   2005.13          17       F
## 1253  101253    783.97           4       M
## 1302  101302    907.55           5       M
## 1324  101324   1243.98           7       F
## 1325  101325    925.62           4       F
## 1334  101334    646.57           3       M
```

```
## 1343   101343     655.37              6        M
## 1367   101367    1294.44              4        M
## 1369   101369    2035.20             17        F
## 1400   101400     632.84              3        M
## 1404   101404     817.79              3        F
## 1411   101411    1028.15              6        F
## 1420   101420    1091.17              6        M
## 1437   101437     880.74              6        M
## 1451   101451    1049.40              7        M
## 1455   101455     752.90              4        F
## 1500   101500    1075.42              9        M
## 1507   101507     799.16              6        M
## 1509   101509     888.78              4        F
## 1552   101552     854.74              5        M
## 1561   101561     842.05              4        M
## 1578   101578     826.90              5        M
## 1580   101580     654.79              3        F
## 1605   101605     979.23              4        F
## 1608   101608    1615.88              9        F
## 1609   101609     717.86              6        M
## 1613   101613    1273.91              4        F
## 1614   101614     782.67              2        F
## 1619   101619    1270.19              6        M
## 1623   101623    1275.41              6        M
## 1626   101626    1262.65              4        M
## 1633   101633     659.30              6        M
## 1636   101636     654.85              5        M
## 1657   101657     942.43              6        M
## 1676   101676    1138.71              6        F
## 1703   101703    1370.68              6        M
## 1735   101735     935.42              5        M
## 1738   101738     676.67              4        M
## 1742   101742    1288.44              5        M
## 1749   101749     660.29              5        M
## 1758   101758    1061.18              7        M
## 1759   101759     625.74              4        M
## 1767   101767     681.80              2        F
## 1785   101785     954.75              4        M
## 1795   101795     670.45              3        M
## 1801   101801    1059.01              5        F
## 1825   101825     698.76              5        F
## 1832   101832    1006.30              6        F
## 1838   101838     785.78              5        M
## 1842   101842     648.68              6        M
## 1851   101851    1282.07              6        F
## 1865   101865    1974.15              5        M
## 1879   101879     755.00              5        M
## 1889   101889     827.37              3        F
## 1900   101900    2223.01             17        M
## 1905   101905     665.55              5        M
## 1933   101933     736.28              2        M
## 1996   101996     687.27              3        F
## 2002   102002     661.82              2        F
## 2005   102005     785.31              5        F
```

```
## 2015   102015    1079.61             5       F
## 2029   102029     912.11             4       M
## 2080   102080     972.90             4       F
## 2093   102093     796.04             4       F
## 2114   102114    1058.28             6       M
## 2146   102146    1163.47             7       M
## 2189   102189     947.85             5       F
## 2199   102199    2224.78            17       M
## 2203   102203    2875.67             8       M
## 2216   102216    1938.21             6       F
## 2226   102226     641.64             4       M
## 2230   102230     702.52             6       M
## 2231   102231    1001.69             6       M
## 2248   102248     692.59             4       F
## 2256   102256     745.86             3       F
## 2278   102278     699.61             2       F
## 2320   102320     893.97             2       M
## 2347   102347    1628.49             4       F
## 2358   102358     840.08             5       F
## 2362   102362     744.73             5       F
## 2369   102369     803.42             5       M
## 2378   102378     835.20             4       M
## 2379   102379     802.61             6       M
## 2383   102383     665.40             5       F
## 2386   102386     834.02             3       M
## 2394   102394     720.95             3       F
## 2397   102397     999.73             4       M
## 2399   102399     792.14             3       F
## 2405   102405     665.16             3       M
## 2412   102412    1260.41             5       M
## 2419   102419     833.06             3       M
## 2422   102422     707.30             3       M
## 2438   102438     821.05             3       M
## 2453   102453    1226.59             6       M
## 2456   102456    1416.15             9       F
## 2464   102464    1100.57             8       F
## 2468   102468     838.86             4       F
## 2478   102478    2159.92            17       M
## 2525   102525    1013.81             7       F
## 2540   102540    3290.38            10       M
## 2541   102541     630.12             3       F
## 2543   102543    1263.58             8       F
## 2547   102547    1073.32            10       M
## 2555   102555    1077.61             6       F
## 2592   102592    3044.65            18       F
## 2630   102630     788.79             4       M
## 2641   102641    1362.12             4       M
## 2644   102644    1321.17             4       F
## 2652   102652     686.63             5       M
## 2663   102663     619.83             4       F
## 2666   102666    1052.81             4       F
## 2692   102692     920.58             3       M
## 2704   102704    1432.52            10       M
## 2707   102707     699.21             5       F
```

```
## 2747   102747    1211.61              8       F
## 2750   102750     804.37              5       M
## 2751   102751     818.05              2       F
## 2810   102810     717.70              3       F
## 2818   102818    1324.05              8       M
## 2826   102826     688.78              5       F
## 2830   102830     700.59              5       M
## 2836   102836    1125.09              6       F
## 2869   102869    1716.32              5       M
## 2875   102875     624.53              5       M
## 2877   102877    1487.57              6       M
## 2886   102886     890.97              4       F
## 2893   102893     742.71              5       F
## 2897   102897    1276.94              5       M
## 2919   102919     736.11              5       F
## 2922   102922     648.51              4       F
## 2923   102923     698.29              3       M
## 2936   102936    1440.62              5       M
## 2953   102953    1293.59              9       M
## 2965   102965    1091.13             10       M
## 2975   102975     751.36              3       F
## 3009   103009     692.53              6       F
## 3014   103014     647.07              3       M
## 3021   103021    1017.24              6       F
## 3026   103026     913.77              4       M
## 3030   103030     995.12              5       M
## 3039   103039     623.03              4       F
## 3050   103050    1295.59              7       F
## 3075   103075    6428.06             20       F
## 3083   103083     912.93              6       M
## 3088   103088     787.16              4       M
## 3128   103128     931.26              5       M
## 3147   103147     660.23              3       M
## 3176   103176    2168.46              7       M
## 3178   103178     665.87              6       M
## 3190   103190     643.77              5       F
## 3193   103193    1172.87              6       F
## 3194   103194     881.02              5       F
## 3232   103232    1011.37              8       M
## 3250   103250     915.57              5       M
## 3266   103266    1081.55              5       M
## 3268   103268     781.55              6       F
## 3278   103278     916.35              6       M
## 3291   103291    1140.77              9       M
## 3317   103317    1128.04              7       F
## 3319   103319     772.27              5       F
## 3320   103320     648.65              2       M
## 3329   103329     928.20              6       F
## 3335   103335     776.24              3       M
## 3339   103339    1324.76              7       F
## 3366   103366    1226.49              5       F
## 3371   103371     712.86              6       M
## 3385   103385     877.64              6       F
## 3395   103395     732.08              3       M
```

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## 3415   103415    624.42          4      F
## 3438   103438   1391.27          5      F
## 3463   103463    716.54          6      M
## 3469   103469   2375.37          9      M
## 3479   103479    682.22          6      M
## 3496   103496   1169.06          5      F
## 3504   103504    924.63          4      M
## 3517   103517    626.87          4      M
## 3521   103521    627.72          3      M
## 3559   103559   1537.22         10      F
## 3577   103577    694.79          6      M
## 3579   103579   1234.63          6      M
## 3612   103612    684.45          6      F
## 3638   103638    629.15          4      M
## 3661   103661    634.98          6      F
## 3672   103672    811.83          3      M
## 3676   103676   1070.00          8      F
## 3684   103684   1245.63          5      M
## 3687   103687   1100.47          5      F
## 3690   103690   1033.89          7      M
## 3699   103699   1210.83          8      M
## 3718   103718    773.94          4      F
## 3731   103731    842.81          4      M
## 3735   103735   4046.90         18      M
## 3739   103739    942.24          3      M
## 3757   103757   1141.14          7      F
## 3770   103770   1413.23          4      F
## 3780   103780    719.64          5      M
## 3788   103788   7606.09         22      F
## 3791   103791    631.74          4      M
## 3793   103793    634.67          6      F
## 3797   103797    838.67          3      F
## 3815   103815   1539.55          5      M
## 3830   103830    911.20          5      F
## 3851   103851    716.41          5      F
## 3866   103866   1619.87          4      F
## 3872   103872    833.54          3      F
## 3895   103895    698.31          5      F
## 3939   103939   2456.03         11      F
## 3977   103977   2698.94          6      F
## 3989   103989   1101.37          9      M
## 3999   103999   1188.27          6      F
## 4012   104012    693.41          5      F
## 4015   104015   1558.03          6      M
## 4021   104021   1086.78          5      F
## 4032   104032    880.02          4      M
## 4042   104042   1296.32          7      F
## 4079   104079    856.53          6      M
## 4081   104081   1011.46          8      M
## 4083   104083    672.08          3      F
## 4084   104084   1626.97          8      F
## 4099   104099    731.58          5      F
## 4128   104128    782.68          5      M
## 4175   104175    686.25          5      M
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## 4184   104184    785.26              5          F
## 4192   104192   1883.43              5          M
## 4193   104193    771.99              6          M
## 4217   104217    628.62              5          F
## 4237   104237    688.98              4          F
## 4256   104256    843.12              3          M
## 4263   104263   1517.19              6          M
## 4268   104268    628.80              4          M
## 4270   104270   1075.32              8          M
## 4272   104272    633.92              4          F
## 4276   104276   2061.50             15          M
## 4284   104284    816.64              6          M
## 4289   104289    992.51              3          F
## 4335   104335   1263.21              6          F
## 4362   104362   1135.99              5          M
## 4401   104401    695.36              2          F
## 4402   104402    756.99              2          F
## 4416   104416   1393.09              9          M
## 4418   104418   1103.89              4          F
## 4461   104461    661.23              3          M
## 4485   104485   2375.78              6          F
## 4489   104489   1542.50              5          F
## 4491   104491    702.84              5          F
## 4516   104516    692.76              5          F
## 4521   104521   1589.14              4          M
## 4526   104526    974.95              3          M
## 4568   104568   1242.43              9          M
## 4607   104607    964.62              3          F
## 4630   104630    820.83              2          F
## 4640   104640   2532.31             16          M
## 4647   104647   1097.81              5          M
## 4683   104683    769.28              3          M
## 4687   104687    891.97              4          M
## 4692   104692    739.33              3          F
## 4711   104711   3484.17             18          F
## 4715   104715    818.19              5          F
## 4733   104733   1715.34              9          F
## 4742   104742   1544.50              9          F
## 4792   104792    825.50              4          M
## 4798   104798    631.17              6          M
## 4801   104801   1321.16              8          F
## 4808   104808   1202.65              8          M
## 4835   104835    637.99              4          M
## 4837   104837   1132.40              4          M
## 4851   104851   1308.98              6          F
## 4856   104856    625.04              5          F
## 4865   104865   1203.34              5          M
## 4883   104883   1149.77              6          F
## 4892   104892    746.65              4          F
## 4893   104893    924.20              5          F
## 4895   104895    632.10              5          M
## 4918   104918    988.97              3          F
## 4938   104938    844.91              5          M
## 4961   104961    743.12              3          F
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## 4970   104970    1103.23          9       M
## 4987   104987    1209.48          6       M
## 4996   104996     787.16          3       M
## 4997   104997     618.99          3       F
## 5026   105026     662.66          2       M
## 5027   105027     766.14          4       F
## 5032   105032     766.19          4       F
## 5051   105051    2379.84         10       F
## 5055   105055     695.52          4       F
## 5092   105092    2365.84          5       F
## 5156   105156     898.94          3       M
## 5179   105179     918.04          2       M
## 5221   105221     797.94          4       F
## 5254   105254     620.55          6       F
## 5257   105257     734.67          5       M
## 5260   105260     696.17          3       F
## 5264   105264    3290.69         17       M
## 5298   105298    1149.62          7       M
## 5315   105315    1538.13          5       F
## 5318   105318     657.67          3       M
## 5364   105364    1535.44          6       F
## 5368   105368     936.92          5       M
## 5373   105373     961.08          6       F
## 5399   105399     663.81          4       M
## 5400   105400     639.19          3       F
## 5430   105430    1008.80          5       F
## 5437   105437    1125.99          9       F
## 5439   105439     811.27          3       M
## 5478   105478     943.70          3       F
## 5482   105482     860.93          6       M
## 5483   105483     688.73          5       M
## 5486   105486     642.16          4       F
## 5493   105493    1228.16          5       F
## 5497   105497    1375.52          5       M
## 5498   105498     742.44          4       M
## 5502   105502    1042.28          9       F
## 5508   105508     759.59          4       F
## 5509   105509     733.57          5       M
## 5528   105528    1492.72          5       F
## 5554   105554    1026.47          9       F
## 5588   105588     642.15          5       F
## 5620   105620     799.43          4       F
## 5648   105648     666.15          6       M
## 5670   105670     867.79          5       F
## 5715   105715    2420.36         16       F
## 5718   105718     802.43          6       M
## 5723   105723     687.43          4       F
## 5726   105726    1131.68          9       F
## 5729   105729     774.41          5       M
## 5753   105753     861.95          2       M
## 5760   105760    1747.73          7       M
## 5770   105770     655.72          2       M
## 5774   105774     910.66          4       F
## 5777   105777    1001.98          8       M
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## 5796   105796    1448.42            6        F
## 5802   105802     631.18            2        F
## 5818   105818    2050.18           17        M
## 5825   105825     692.92            4        M
## 5828   105828     680.21            6        M
## 5831   105831    1544.70            5        F
## 5837   105837     713.02            4        M
## 5839   105839     782.10            3        F
## 5840   105840    1577.24            7        F
## 5868   105868     655.11            6        M
## 5876   105876    2075.67           12        M
## 5877   105877     860.22            3        M
## 5894   105894    2595.71           17        M
## 5912   105912     811.60            4        F
## 5936   105936     725.62            6        F
## 5947   105947     670.78            3        F
## 5949   105949     716.94            4        F
## 5952   105952    1145.85            6        F
## 5954   105954     767.05            3        M
## 5955   105955     677.07            3        M
## 5962   105962     701.60            5        M
## 5974   105974     902.21            6        M
## 5992   105992    1378.10            9        M
## 5997   105997     622.85            4        F
## 6014   106014    1030.92           10        F
## 6030   106030     747.22            2        F
## 6048   106048    2228.00           11        M
## 6077   106077     740.22            3        M
## 6119   106119     808.43            5        F
## 6120   106120     675.36            5        M
## 6124   106124    1175.20            8        M
## 6135   106135    2377.21            9        F
## 6158   106158    1413.59            7        M
## 6177   106177     754.67            3        M
## 6188   106188    2752.76            6        M
## 6204   106204     995.91            4        M
## 6223   106223     731.96            6        F
## 6234   106234     775.82            3        M
## 6246   106246    1255.25            5        F
## 6252   106252    1167.96            9        M
## 6261   106261     671.16            2        M
## 6283   106283    1958.05            5        F
## 6288   106288    1796.15            4        M
## 6301   106301     692.84            3        M
## 6309   106309    1317.45            8        F
## 6371   106371    2380.54            9        M
## 6378   106378     951.96            3        M
## 6380   106380    1268.35            5        F
## 6401   106401     656.12            2        F
## 6404   106404     627.19            3        M
## 6426   106426     627.03            4        M
## 6428   106428    1754.75            6        M
## 6438   106438     846.56            4        F
## 6445   106445     887.06            5        M
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## 6467   106467    907.55            5        M
## 6472   106472   1176.99            6        M
## 6481   106481   1804.60            8        M
## 6486   106486   1196.91            7        F
## 6508   106508   1001.33            6        F
## 6520   106520    636.19            4        F
## 6537   106537    637.53            3        M
## 6538   106538    632.70            3        F
## 6544   106544    769.92            4        F
## 6551   106551   1183.04            6        M
## 6590   106590   1312.65            6        M
## 6605   106605    767.25            4        M
## 6611   106611   1004.74            9        M
## 6616   106616    856.22            6        M
## 6626   106626   1186.89            8        M
## 6653   106653    754.71            2        F
## 6658   106658    970.27            5        F
## 6675   106675   2018.40            5        F
## 6694   106694   2000.18            9        M
## 6706   106706    659.15            3        F
## 6724   106724   1150.14            5        M
## 6725   106725    736.51            4        F
## 6737   106737    706.20            2        M
## 6739   106739    795.57            5        F
## 6745   106745    995.35            3        M
## 6760   106760    658.00            2        F
## 6761   106761    739.08            3        M
## 6766   106766   1661.81            6        M
## 6769   106769   1732.01            5        F
## 6776   106776   1001.57            7        M
## 6785   106785   1108.24            6        M
## 6804   106804    645.92            3        F
## 6817   106817    932.78            4        M
## 6821   106821   1292.02            9        M
## 6839   106839    804.63            4        F
## 6840   106840    909.64            3        F
## 6857   106857   1208.20            5        F
## 6867   106867    677.32            3        F
## 6876   106876    645.45            3        F
## 6886   106886   1662.75            8        M
## 6889   106889    858.32            5        F
## 6915   106915    990.45            5        F
## 6928   106928    727.35            5        F
## 6945   106945    783.06            5        F
## 6954   106954    652.09            2        F
## 6964   106964    733.51            6        F
## 6972   106972    784.92            3        M
## 6983   106983    891.68            3        M
## 7002   107002    624.91            2        M
## 7028   107028   1035.55            7        F
## 7039   107039    625.76            3        M
## 7045   107045    654.11            2        F
## 7047   107047    840.45            4        F
## 7051   107051   1263.54            6        F
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## 7054   107054    1180.71          10      M
## 7083   107083     663.90           5      F
## 7108   107108     656.14           5      F
## 7116   107116     679.29           5      F
## 7118   107118     657.57           5      M
## 7120   107120     794.86           4      M
## 7133   107133     721.61           3      F
## 7137   107137     688.20           6      M
## 7142   107142    1017.02           6      F
## 7174   107174     770.99           4      M
## 7188   107188     653.17           5      M
## 7191   107191    1328.75           5      F
## 7204   107204    1342.59           4      M
## 7216   107216     654.28           5      M
## 7221   107221     789.28           5      F
## 7274   107274     854.34           6      M
## 7281   107281     965.43           4      F
## 7286   107286     956.00           5      F
## 7289   107289     673.77           4      F
## 7292   107292    1769.69           5      F
## 7295   107295     791.54           3      F
## 7352   107352     763.19           3      M
## 7414   107414     715.44           4      F
## 7452   107452     693.16           3      F
## 7455   107455     788.61           2      F
## 7466   107466     766.50           6      F
## 7467   107467    1077.94           7      M
## 7475   107475     942.76           5      F
## 7485   107485    1325.07           4      M
## 7511   107511     854.50           4      F
## 7512   107512    1163.89           6      F
## 7547   107547     819.66           2      F
## 7552   107552    1145.26           6      F
## 7577   107577    1142.91           6      F
## 7590   107590     925.93           3      F
## 7600   107600     857.30           4      F
## 7613   107613     737.40           5      F
## 7627   107627     749.99           5      F
## 7638   107638    1316.51           6      F
## 7646   107646     715.86           6      M
## 7654   107654     768.72           3      F
## 7670   107670     956.74           5      F
## 7683   107683     915.54           3      F
## 7684   107684     655.45           2      M
## 7728   107728    1008.34           7      F
## 7745   107745     747.71           2      M
## 7764   107764    1592.62           8      F
## 7768   107768     624.83           2      M
## 7789   107789     752.58           4      F
## 7792   107792     952.22           6      F
## 7805   107805    1218.02           8      F
## 7826   107826     859.42           4      F
## 7833   107833     781.70           4      M
## 7834   107834    1218.54           6      M
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## 7836   107836    687.20           5        M
## 7841   107841   1472.65           4        F
## 7859   107859    620.27           3        F
## 7870   107870   1101.76          10        F
## 7871   107871    696.36           3        F
## 7874   107874    634.18           4        M
## 7875   107875    703.62           6        M
## 7882   107882    958.45           5        F
## 7917   107917    945.80           5        F
## 7925   107925    748.53           4        F
## 7988   107988   3545.59          13        M
## 8012   108012    696.24           5        F
## 8107   108107    965.18           4        M
## 8117   108117   1790.88           6        M
## 8128   108128    642.15           2        F
## 8135   108135    894.25           6        F
## 8139   108139    663.61           4        M
## 8141   108141    758.34           2        M
## 8151   108151   1794.81           9        F
## 8159   108159    925.87           3        M
## 8175   108175    750.18           4        F
## 8176   108176   1076.33           7        M
## 8178   108178    773.14           3        F
## 8192   108192    791.33           4        M
## 8198   108198   1142.12          10        F
## 8202   108202    632.46           5        F
## 8220   108220    621.73           4        M
## 8223   108223    641.75           4        M
## 8228   108228    665.64           5        M
## 8233   108233   1624.00           8        M
## 8238   108238    688.36           3        M
## 8250   108250   1393.43           7        F
## 8255   108255    678.46           2        M
## 8268   108268   1769.71           5        F
## 8277   108277   1041.70           9        M
## 8278   108278   1209.10           6        M
## 8283   108283   1257.92           8        F
## 8300   108300    979.07           4        M
## 8302   108302    626.13           4        M
## 8336   108336    840.29           3        F
## 8344   108344   1116.50           7        M
## 8367   108367   2220.13           5        F
## 8374   108374    663.20           2        F
## 8402   108402    733.83           4        F
## 8405   108405   1084.50           8        F
## 8407   108407    686.47           3        F
## 8419   108419    983.68           3        M
## 8442   108442   2491.37           8        F
## 8449   108449   1930.70           6        M
## 8470   108470    626.90           4        F
## 8471   108471    647.10           3        M
## 8476   108476    723.32           5        F
## 8480   108480   2477.98           9        F
## 8508   108508    751.16           6        M
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## 8509   108509    796.02           3      F
## 8520   108520   1065.72           8      F
## 8523   108523    672.34           4      M
## 8551   108551   1189.23           6      F
## 8567   108567    984.25           3      M
## 8571   108571   1260.10           7      M
## 8574   108574    693.83           6      M
## 8578   108578    689.33           4      M
## 8583   108583    877.13           4      F
## 8588   108588    670.58           4      M
## 8591   108591    819.59           4      M
## 8593   108593   1175.06           6      M
## 8607   108607   1923.21           8      M
## 8615   108615   1008.64           5      M
## 8619   108619    666.67           6      M
## 8623   108623   2090.46          11      M
## 8642   108642    801.00           3      M
## 8656   108656    784.32           2      M
## 8667   108667   1093.18           5      F
## 8702   108702   1013.77           9      M
## 8764   108764   2570.35          10      F
## 8767   108767    696.46           2      F
## 8791   108791    864.14           3      F
## 8797   108797   1197.85           9      M
## 8820   108820   1066.40           7      M
## 8847   108847    755.16           5      F
## 8853   108853    779.57           3      M
## 8886   108886    639.51           2      F
## 8890   108890    933.57           5      F
## 8894   108894    738.94           4      M
## 8898   108898    904.76           5      F
## 8925   108925   1009.46           7      M
## 8938   108938   1503.81           5      M
## 8941   108941    707.44           6      M
## 8954   108954    846.74           4      F
## 8976   108976   1076.90           5      M
## 8982   108982    770.63           5      M
## 8991   108991   3866.83          10      M
## 8998   108998    777.55           5      M
## 9031   109031   1126.77           4      M
## 9041   109041    866.35           4      M
## 9069   109069    636.40           5      M
## 9079   109079    934.27           5      M
## 9088   109088    827.83           4      F
## 9103   109103   1142.01           5      F
## 9110   109110   1128.66           9      F
## 9129   109129    742.73           4      M
## 9155   109155    927.67           5      M
## 9157   109157   1264.57           6      M
## 9161   109161    626.98           3      M
## 9166   109166   1371.25           4      M
## 9170   109170    644.02           3      F
## 9184   109184    793.50           6      F
## 9192   109192    857.07           3      M
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## 9193  109193    863.71          3       F
## 9200  109200   1194.18          8       F
## 9201  109201    798.41          3       F
## 9215  109215    819.88          3       M
## 9267  109267   1065.12          8       F
## 9278  109278    801.93          3       M
## 9330  109330   1363.43          6       F
## 9333  109333    631.33          5       F
## 9334  109334    648.13          3       F
## 9336  109336    822.22          5       F
## 9342  109342    800.79          4       M
## 9352  109352   1032.75          6       M
## 9377  109377    790.44          2       M
## 9407  109407    827.52          3       M
## 9429  109429   1334.85          9       F
## 9480  109480   1094.49          8       M
## 9507  109507   1420.69          7       F
## 9556  109556    949.77          4       F
## 9560  109560   1465.01          7       M
## 9571  109571   3278.25         10       F
## 9594  109594    717.96          3       M
## 9626  109626   1080.84          4       M
## 9631  109631    713.54          3       M
## 9633  109633   1659.53          7       F
## 9637  109637    762.99          3       F
## 9641  109641    819.59          5       F
## 9643  109643    626.60          5       M
## 9645  109645    977.16          3       M
## 9647  109647    699.77          6       F
## 9670  109670   2341.38          8       M
## 9715  109715   1603.97          8       M
## 9716  109716    681.58          3       M
## 9724  109724    781.66          3       F
## 9767  109767   1493.28          5       M
## 9775  109775    764.91          3       F
## 9781  109781   2108.47          8       M
## 9785  109785    747.02          4       F
## 9796  109796   1120.69          6       M
## 9803  109803    693.50          4       M
## 9815  109815   1662.48          4       F
## 9816  109816   6091.15         21       F
## 9820  109820    680.41          5       F
## 9827  109827    842.77          5       F
## 9845  109845   1102.25          5       F
## 9846  109846   1428.53          5       F
## 9863  109863    721.10          5       F
## 9879  109879    778.53          5       M
## 9881  109881    777.20          5       F
## 9892  109892    670.96          6       F
## 9893  109893   1040.05          4       F
## 9897  109897   1725.80          5       F
## 9903  109903    806.05          5       M
## 9913  109913    786.06          6       F
## 9915  109915    726.96          4       M
```

```
## 9946   109946       1034.53                8        M
## 9984   109984       1636.38                8        F
## 9987   109987        662.00                3        F
## 9988   109988        666.39                3        F
## 9990   109990        650.50                3        F
```

```r
###TUTORIAL 2 STARTS HERE
Forced_Expiratory_Volume <- read.csv("~/GitHub/DSA1101 Slayers/datasets/FEV.csv")
fev_var <- Forced_Expiratory_Volume$FEV
attach(Forced_Expiratory_Volume)
#1a) Response variable: FEV measurement

hist(fev_var, freq = FALSE, main = paste("Histogram of Forced Expiratory Volume (FEV)"),
     xlab = "FEV",
     ylab = "Frequency",
     col = "blue",
     ylim = c(0, 0.5))
lines(density(fev_var), col = "red")
```

Histogram of Forced Expiratory Volume (FEV)
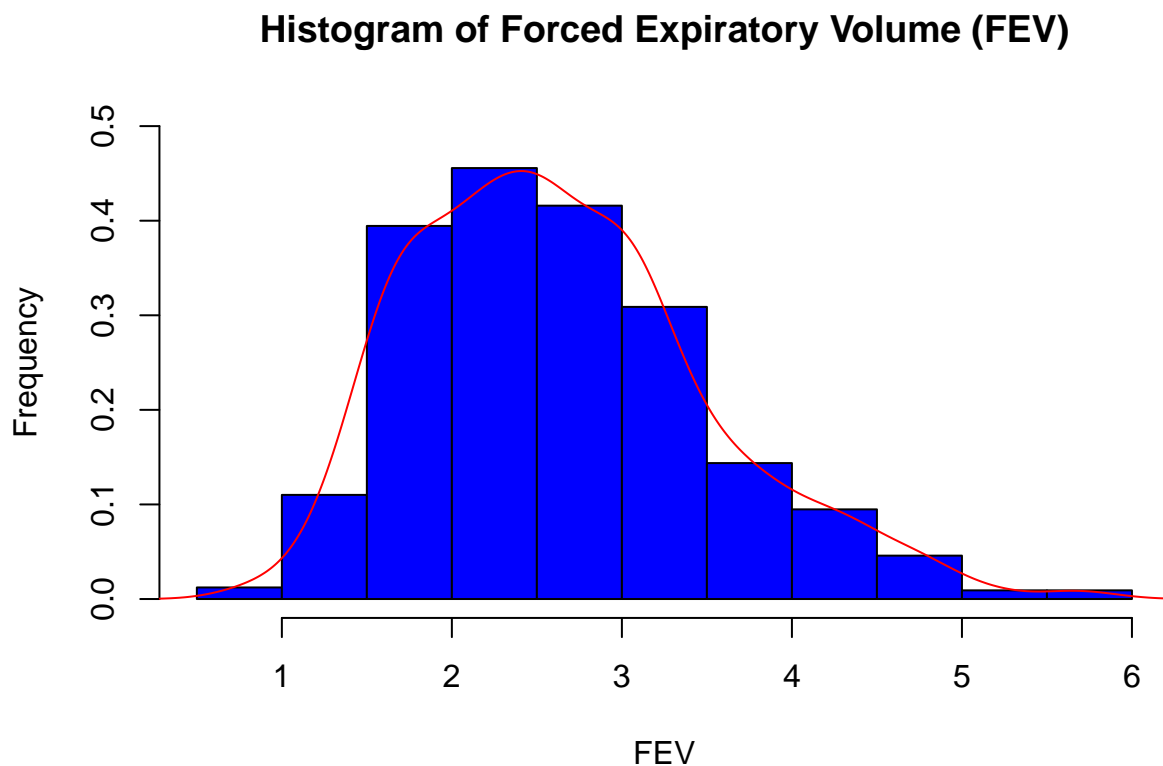

```r
#1b) The histogram is right skewed, more values to the right of the median than the left.
# The range of FEV values is from 1 to 6.
# The modal value is 2(???)
# FEV does not follow a normal distribution because it is not symmetrical

# 1c)
boxplot(fev_var, xlab = "FEV", col = "blue")
```

FEV
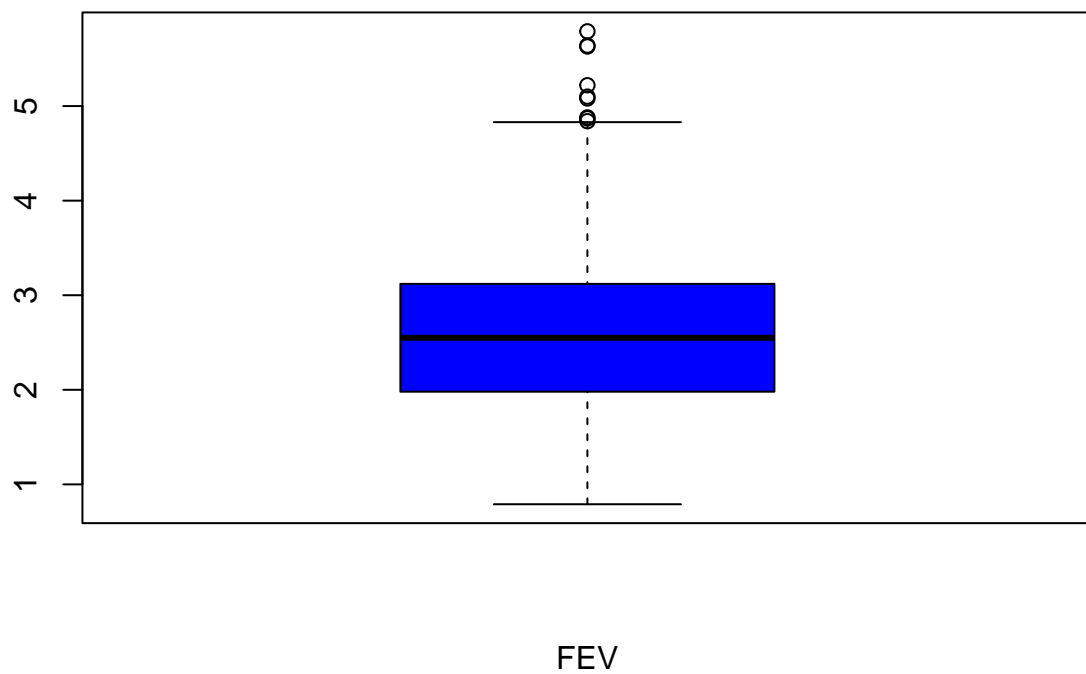
```r
boxplot(fev_var) #is fine too lol its just "less fancy"
```
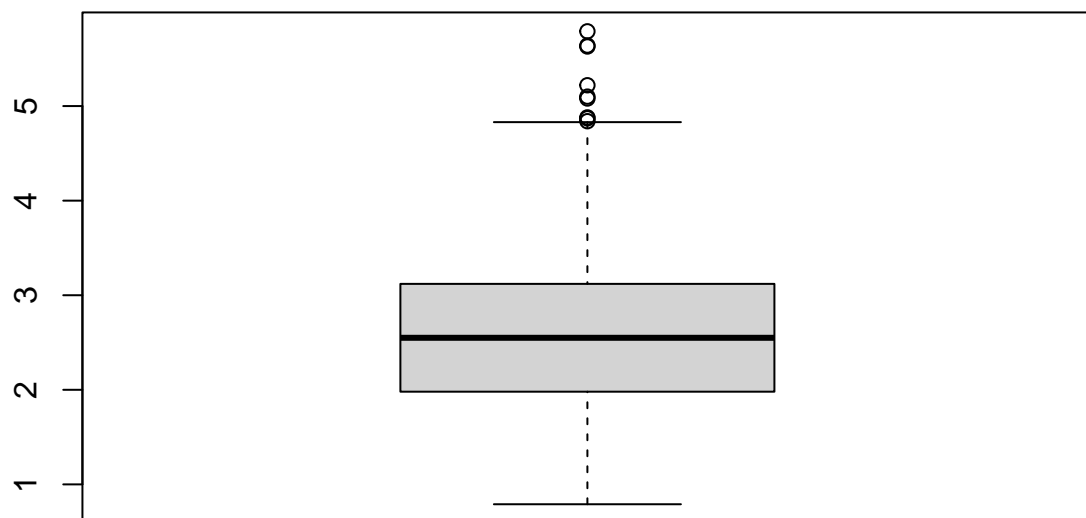
```
outtie  = boxplot(fev_var, xlab = "FEV", col = "blue")$out
```

FEV
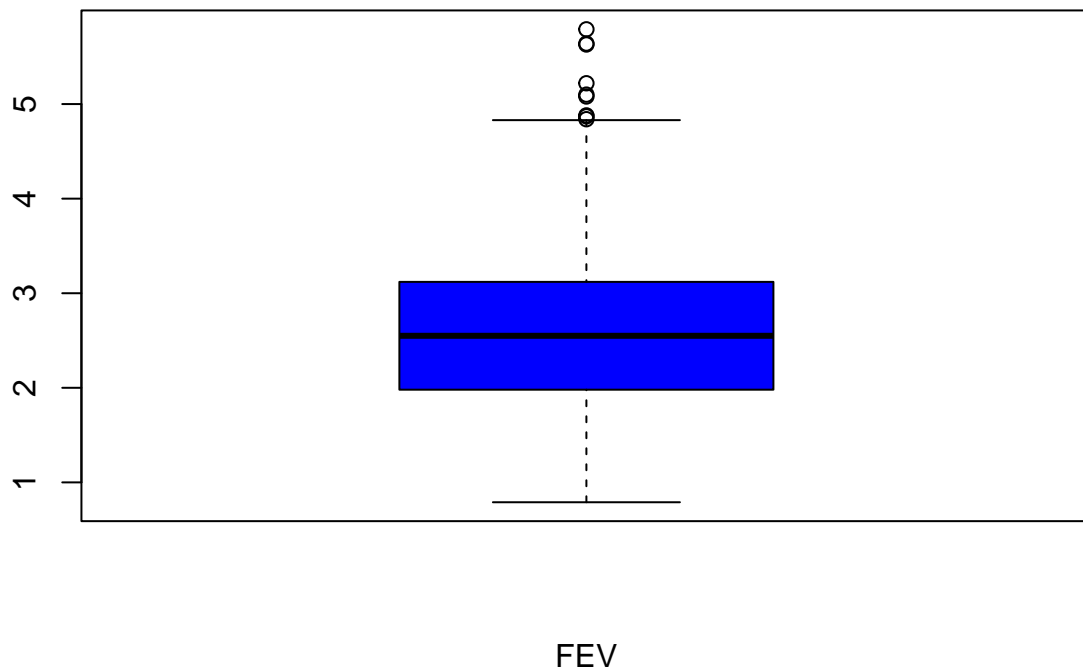
```
outtie
```

```
## [1] 4.84 5.22 4.88 5.08 5.10 5.79 5.63 5.64 4.87
```

```
indexes = which(fev_var %in% c(outtie))
fev_var[c(indexes)]
```

```
## [1] 4.84 5.22 4.88 5.08 5.10 5.79 5.63 5.64 4.87
```

```
# There are some outliers, but marjority of datapoints are below 4.7
# Right skewed. Median is around 2.5
# Unimodal


qqnorm(fev_var, pch = 10)
qqline(fev_var, col = "red")
```

Normal Q–Q Plot
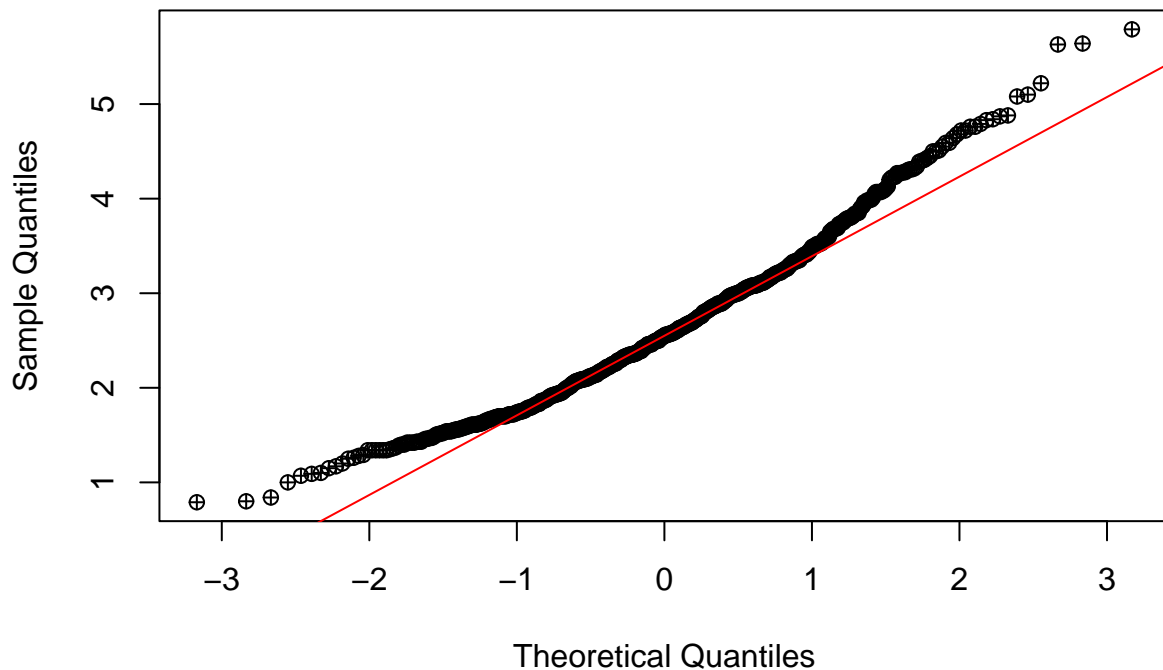

```r
# 1d) Generally, yes. Becos unimodal. But quite right skweded

#1e)
# Create separate histograms for male and female FEV, then obtain separate numerical summaries
# for males and female FEV. Comment on what you observe

#man im tired, heres the Unhinged way
female_FEV <- Forced_Expiratory_Volume %>%
  select(FEV, Sex) %>%
  filter(Sex == 1)
female_FEV <- female_FEV$FEV

#heres the less unhinged way
female_FEV <- Forced_Expiratory_Volume$FEV[Forced_Expiratory_Volume$Sex == 1]

male_FEV <- Forced_Expiratory_Volume$FEV[Forced_Expiratory_Volume$Sex == 0]

FEV <- fev_var

#EVEN MORE LESS UNHINGED:
female = FEV[which(Sex == 0)] #or FEV[Sex == 0] works also
male = FEV[which(Sex == 1)]

#TO PRINT GRAPHS TGT/SIMULTANIOUSLY
opar <- par(mfrom = c(1,2))
```

```
## Warning in par(mfrom = c(1, 2)): "mfrom" is not a graphical parameter
```

```r
hist(female_FEV, freq = FALSE, main = paste("Histogram of Forced Expiratory Volume (FEV) by 1"),
     xlab = "FEV",
     ylab = "Frequency",
     col = "blue",
     ylim = c(0, 0.6))
```

Histogram of Forced Expiratory Volume (FEV) by 1
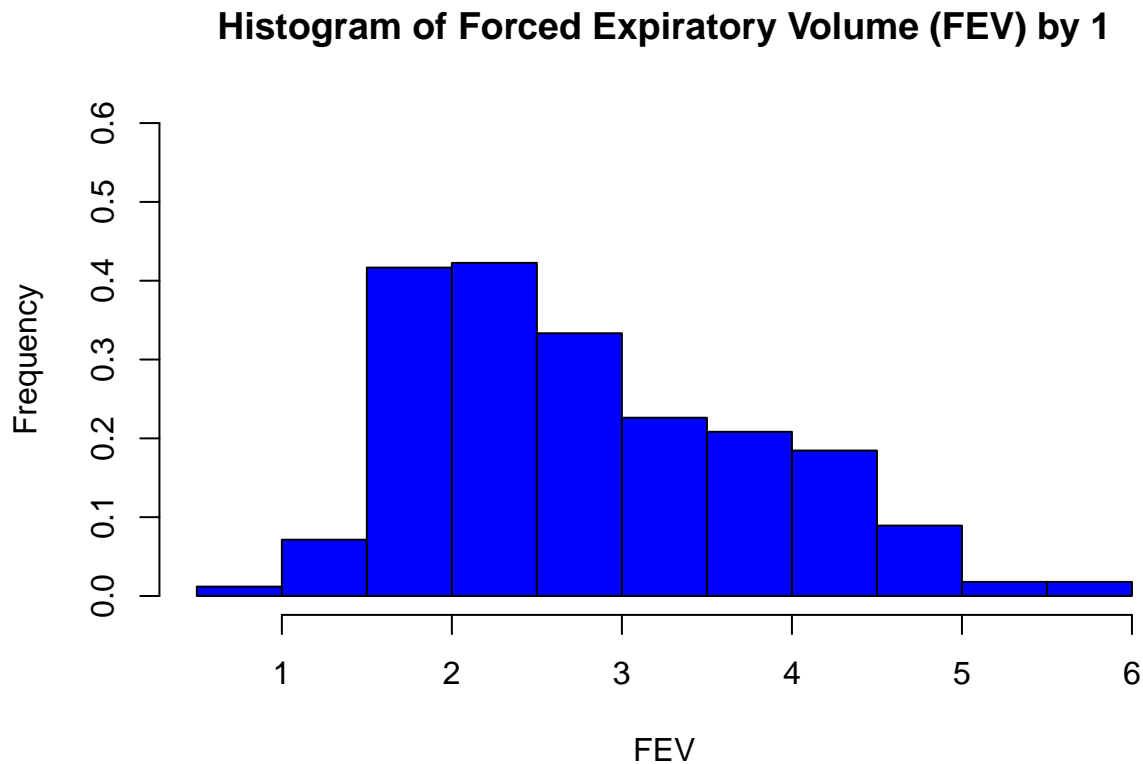

```r
hist(male_FEV, freq = FALSE, main = paste("Histogram of Forced Expiratory Volume (FEV) by 0"),
     xlab = "FEV",
     ylab = "Frequency",
     col = "red",
     ylim = c(0, 0.6),
     xlim = c(0, 5))
```

Histogram of Forced Expiratory Volume (FEV) by 0
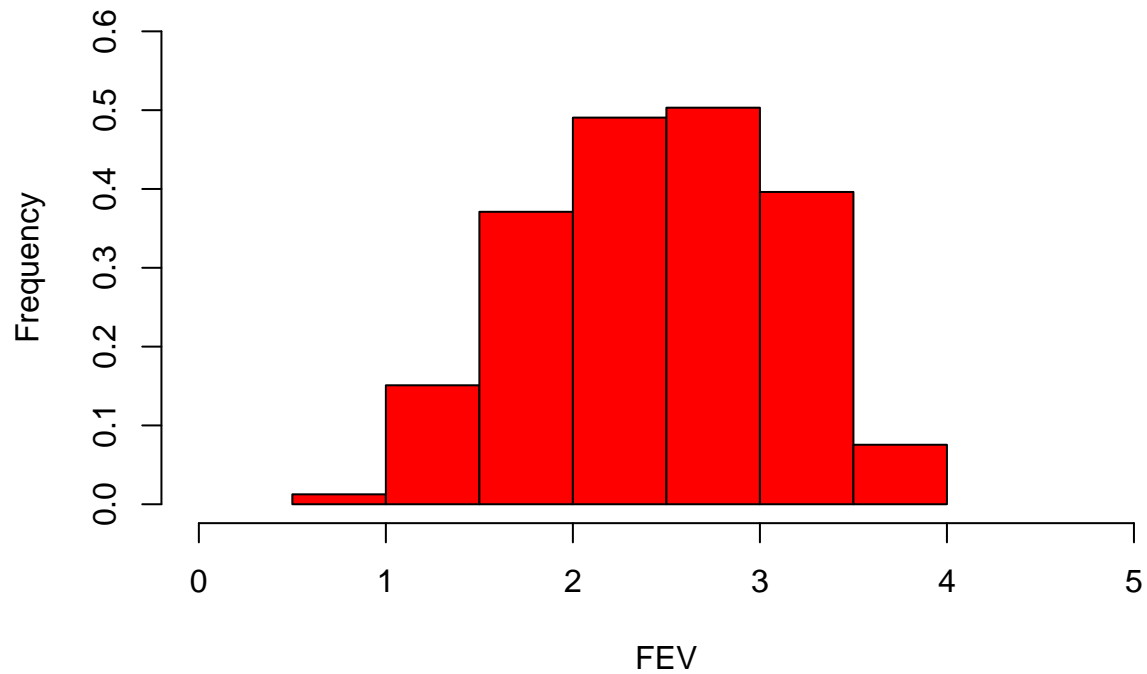

```
#Comments
#Female FEV has a larger range than male FEV
#Male modal value (2.5) slightly higher than Female (2)
#Male is left skew, Female is right skew

#1f) Create a scatterplot with height (in metres) on the x-axis and FEV on the y-axis
heighty = Forced_Expiratory_Volume$height

plot(heighty, fev_var, pch = 20, col = "darkblue")
```

```
opar <- par(mfrom = c(1,2))
```
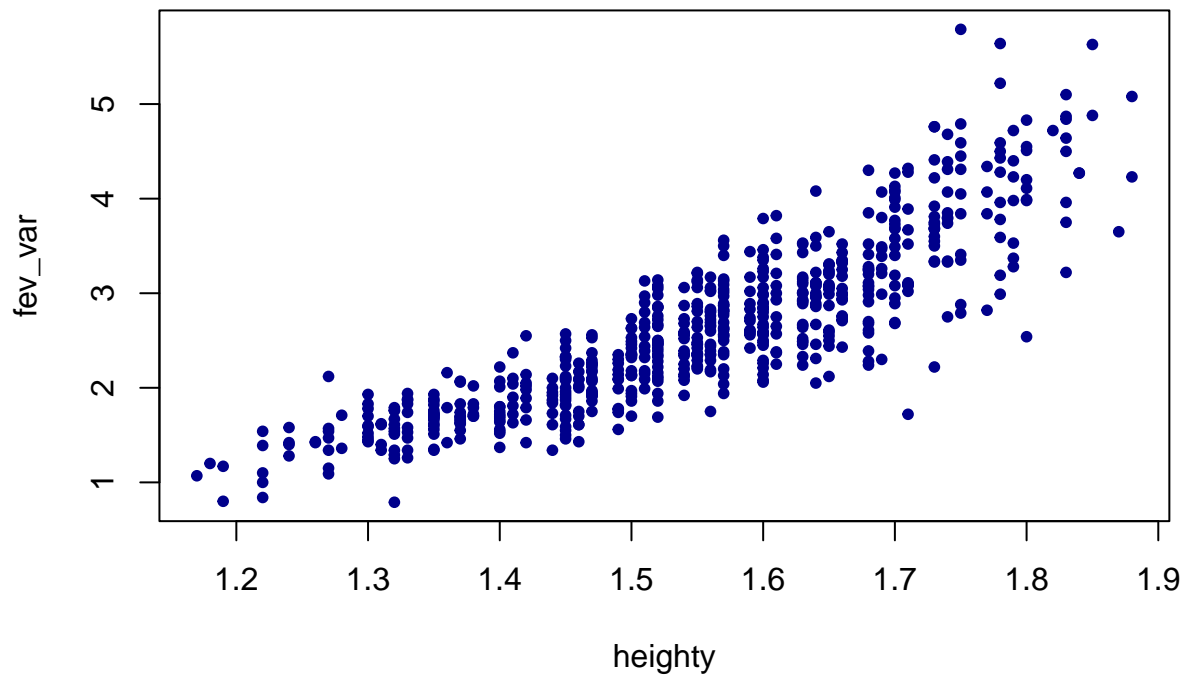
```
## Warning in par(mfrom = c(1, 2)): "mfrom" is not a graphical parameter
```

```
plot(heighty, fev_var, type = "n")
points(female ~ height[which(Sex==0)], col = "red", pch = 20)
points(male ~ height[which(Sex==1)], col = "red", pch = 20)
legend(1.2, 5, legend = c("Female", "Male"), col = c("red", "darkblue"), pch = c(20,20))
```
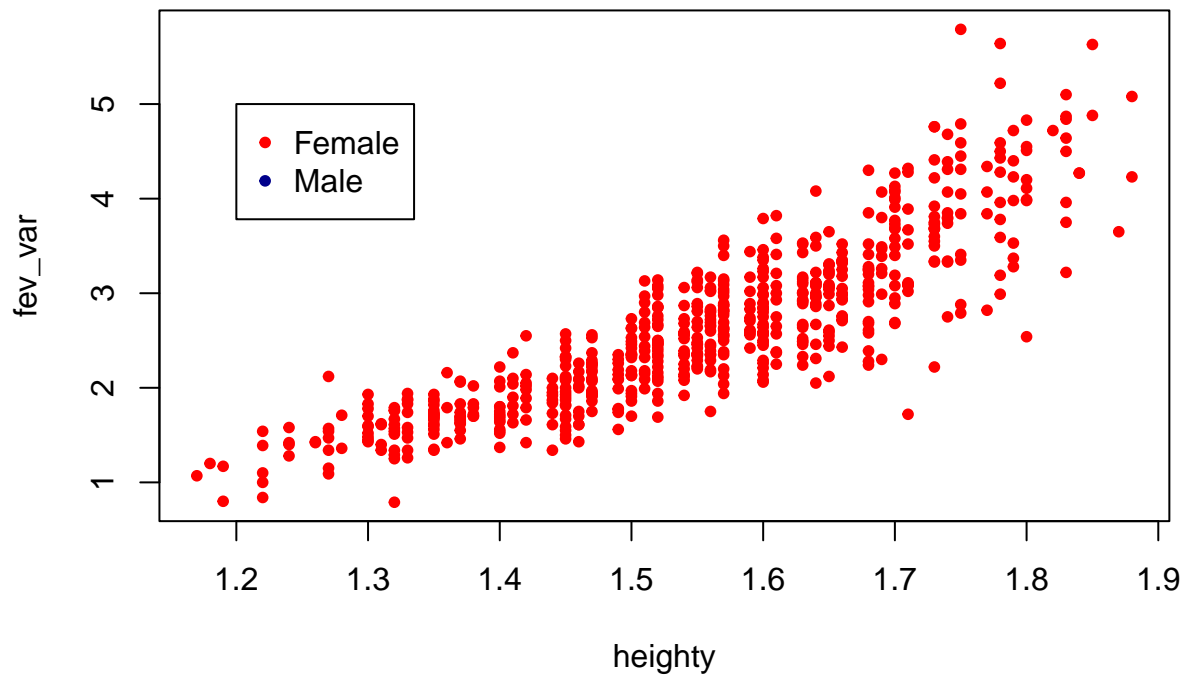
```
#1g) Create a scatterplot with height (in metres) on the x-axis and FEV on the y-axis

cor(heighty, fev_var) #0.8675619
```

```
## [1] 0.8675619
```

```
#There is a positive association btwn height and FEV bc corr vairable is positive
#Since corr variable is close to 1, there is a strong association between height and FEV

#try using points() too

#2a)
Fibo = 0
F1 = 1
F2 = 1
for (i in 1:45) {
  Fibo = F1 + F2
  F1 = F2
  F2 = Fibo
  print(Fibo)
}
```

```
## [1] 2
```

```
## [1] 3
## [1] 5
## [1] 8
## [1] 13
## [1] 21
## [1] 34
## [1] 55
## [1] 89
## [1] 144
## [1] 233
## [1] 377
## [1] 610
## [1] 987
## [1] 1597
## [1] 2584
## [1] 4181
## [1] 6765
## [1] 10946
## [1] 17711
## [1] 28657
## [1] 46368
## [1] 75025
## [1] 121393
## [1] 196418
## [1] 317811
## [1] 514229
## [1] 832040
## [1] 1346269
## [1] 2178309
## [1] 3524578
## [1] 5702887
## [1] 9227465
## [1] 14930352
## [1] 24157817
## [1] 39088169
## [1] 63245986
## [1] 102334155
## [1] 165580141
## [1] 267914296
## [1] 433494437
## [1] 701408733
## [1] 1134903170
## [1] 1836311903
## [1] 2971215073
```

```r
#BETTER WAY: USE LISTS to hold all Fibo numbers
Fibo[1:2] = 1
for (i in 3:45){
  Fibo[i] = Fibo[i-1] + Fibo[i-2]
}
print(Fibo)
```

```
##  [1]           1           1           2           3           5           8
##  [7]          13          21          34          55          89         144
```

```
## [13]         233         377         610         987        1597        2584
## [19]        4181        6765       10946       17711       28657       46368
## [25]       75025      121393      196418      317811      514229      832040
## [31]     1346269     2178309     3524578     5702887     9227465    14930352
## [37]    24157817    39088169    63245986   102334155   165580141   267914296
## [43]   433494437   701408733  1134903170
```

```r
print(Fibo[40])
```

```
## [1] 102334155
```

```r
n = sum(Fibo <= 5000000) + 1; n
```

```
## [1] 34
```

```r
n = max(which(Fibo<=5000000)) + 1; n
```

```
## [1] 34
```

```r
#2b)

Fibo = 0
F1 = 1
F2 = 1
for (i in 1:45) {
  Fibo = F1 + F2
  F1 = F2
  F2 = Fibo
  if (i == 40) {
    print(Fibo)
    break
  }
}
```

```
## [1] 267914296
```

```r
Fibo = 0
F1 = 1
F2 = 1
count = 0
while (Fibo < 5000000) {
  Fibo = F1 + F2
  F1 = F2
  F2 = Fibo
  count = count + 1
}
paste0("smallest n is ", count)
```

```
## [1] "smallest n is 32"
```