Intro to Data Science - Lab 3

IST687 Section M003

Professor Anderson

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#Select one of the below and add needed information # 1. I did this homework by myself, with help from the book and the professor.

#Instructions: Be prepared to report the whole class at the conclusion of the breakout
#group. Run the necessary code on your own instance of R-Studio. Save the code: It
#will be useful on your homework!

#1. Get an explanation of the contents of the state.x77 data set: help("state.x77")

```
help("state.x77")
```

#2. Create a dataframe from the built-in state.x77 data set, store in a variable named 'dfStates77'

```
dfStates77 <- state.x77
dfStates77
```

```
##               Population Income Illiteracy Life Exp Murder HS Grad Frost
## Alabama             3615   3624        2.1    69.05   15.1    41.3    20
## Alaska               365   6315        1.5    69.31   11.3    66.7   152
## Arizona             2212   4530        1.8    70.55    7.8    58.1    15
## Arkansas            2110   3378        1.9    70.66   10.1    39.9    65
## California         21198   5114        1.1    71.71   10.3    62.6    20
## Colorado            2541   4884        0.7    72.06    6.8    63.9   166
## Connecticut         3100   5348        1.1    72.48    3.1    56.0   139
## Delaware             579   4809        0.9    70.06    6.2    54.6   103
## Florida             8277   4815        1.3    70.66   10.7    52.6    11
## Georgia             4931   4091        2.0    68.54   13.9    40.6    60
## Hawaii               868   4963        1.9    73.60    6.2    61.9     0
## Idaho                813   4119        0.6    71.87    5.3    59.5   126
## Illinois           11197   5107        0.9    70.14   10.3    52.6   127
## Indiana             5313   4458        0.7    70.88    7.1    52.9   122
## Iowa                2861   4628        0.5    72.56    2.3    59.0   140
## Kansas              2280   4669        0.6    72.58    4.5    59.9   114
## Kentucky            3387   3712        1.6    70.10   10.6    38.5    95
## Louisiana           3806   3545        2.8    68.76   13.2    42.2    12
## Maine               1058   3694        0.7    70.39    2.7    54.7   161
## Maryland            4122   5299        0.9    70.22    8.5    52.3   101
## Massachusetts       5814   4755        1.1    71.83    3.3    58.5   103
## Michigan            9111   4751        0.9    70.63   11.1    52.8   125
## Minnesota           3921   4675        0.6    72.96    2.3    57.6   160
## Mississippi         2341   3098        2.4    68.09   12.5    41.0    50
## Missouri            4767   4254        0.8    70.69    9.3    48.8   108
## Montana              746   4347        0.6    70.56    5.0    59.2   155
## Nebraska            1544   4508        0.6    72.60    2.9    59.3   139
```

```
## Nevada                590   5149        0.5    69.03   11.5    65.2   188
## New Hampshire         812   4281        0.7    71.23    3.3    57.6   174
## New Jersey           7333   5237        1.1    70.93    5.2    52.5   115
## New Mexico           1144   3601        2.2    70.32    9.7    55.2   120
## New York            18076   4903        1.4    70.55   10.9    52.7    82
## North Carolina       5441   3875        1.8    69.21   11.1    38.5    80
## North Dakota          637   5087        0.8    72.78    1.4    50.3   186
## Ohio                10735   4561        0.8    70.82    7.4    53.2   124
## Oklahoma             2715   3983        1.1    71.42    6.4    51.6    82
## Oregon               2284   4660        0.6    72.13    4.2    60.0    44
## Pennsylvania        11860   4449        1.0    70.43    6.1    50.2   126
## Rhode Island          931   4558        1.3    71.90    2.4    46.4   127
## South Carolina       2816   3635        2.3    67.96   11.6    37.8    65
## South Dakota          681   4167        0.5    72.08    1.7    53.3   172
## Tennessee            4173   3821        1.7    70.11   11.0    41.8    70
## Texas               12237   4188        2.2    70.90   12.2    47.4    35
## Utah                 1203   4022        0.6    72.90    4.5    67.3   137
## Vermont               472   3907        0.6    71.64    5.5    57.1   168
## Virginia             4981   4701        1.4    70.08    9.5    47.8    85
## Washington           3559   4864        0.6    71.72    4.3    63.5    32
## West Virginia        1799   3617        1.4    69.48    6.7    41.6   100
## Wisconsin            4589   4468        0.7    72.48    3.0    54.5   149
## Wyoming               376   4566        0.6    70.29    6.9    62.9   173
##                    Area
## Alabama           50708
## Alaska           566432
## Arizona          113417
## Arkansas          51945
## California       156361
## Colorado         103766
## Connecticut        4862
## Delaware           1982
## Florida           54090
## Georgia           58073
## Hawaii             6425
## Idaho             82677
## Illinois          55748
## Indiana           36097
## Iowa              55941
## Kansas            81787
## Kentucky          39650
## Louisiana         44930
## Maine             30920
## Maryland           9891
## Massachusetts      7826
## Michigan          56817
## Minnesota         79289
## Mississippi       47296
## Missouri          68995
## Montana          145587
## Nebraska          76483
## Nevada           109889
## New Hampshire      9027
## New Jersey         7521
```

```
## New Mexico     121412
## New York        47831
## North Carolina  48798
## North Dakota    69273
## Ohio            40975
## Oklahoma        68782
## Oregon          96184
## Pennsylvania    44966
## Rhode Island     1049
## South Carolina  30225
## South Dakota    75955
## Tennessee       41328
## Texas          262134
## Utah            82096
## Vermont          9267
## Virginia        39780
## Washington      66570
## West Virginia   24070
## Wisconsin       54464
## Wyoming         97203
```

#3. Summarize the variables in your dfStates77 data set - using the summary() function

```
summary(dfStates77)
```

```
##    Population        Income       Illiteracy       Life Exp
##  Min.   :  365   Min.   :3098   Min.   :0.500   Min.   :67.96
##  1st Qu.: 1080   1st Qu.:3993   1st Qu.:0.625   1st Qu.:70.12
##  Median : 2838   Median :4519   Median :0.950   Median :70.67
##  Mean   : 4246   Mean   :4436   Mean   :1.170   Mean   :70.88
##  3rd Qu.: 4968   3rd Qu.:4814   3rd Qu.:1.575   3rd Qu.:71.89
##  Max.   :21198   Max.   :6315   Max.   :2.800   Max.   :73.60
##      Murder          HS Grad          Frost             Area
##  Min.   : 1.400   Min.   :37.80   Min.   :  0.00   Min.   :  1049
##  1st Qu.: 4.350   1st Qu.:48.05   1st Qu.: 66.25   1st Qu.: 36985
##  Median : 6.850   Median :53.25   Median :114.50   Median : 54277
##  Mean   : 7.378   Mean   :53.11   Mean   :104.46   Mean   : 70736
##  3rd Qu.:10.675   3rd Qu.:59.15   3rd Qu.:139.75   3rd Qu.: 81162
##  Max.   :15.100   Max.   :67.30   Max.   :188.00   Max.   :566432
```

#4. Calculate the total population of the U.S. by adding together the populations of
#each of the individual states in dfStates77. Store the result in a new variable
#called totalPop77.

```
totalPop77 <- sum(dfStates77[, 'Population'])
totalPop77
```

```
## [1] 212321
```

#5. Use R code to read a CSV data file directly from the web. Store the dataset #into a new dataframe, called dfStates17. The URL is: " https://intro-datascience.s3.us-east-2.amazonaws.com/statesNew.csv"
#Note: Use the function read_csv( ) to read in the data.

#You will need to run library(readr) or library(tidyverse) before you can run #read_csv( ). If that generates an error, then you first need to do
#install.packages("readr") or install.packages("tidyverse")

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --

## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.4     v dplyr   1.0.7
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   2.0.1     v forcats 0.5.1

## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
dfStates17 <- read_csv('https://intro-datascience.s3.us-east-2.amazonaws.com/statesNew.csv')
```

```
## Rows: 50 Columns: 19

## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr  (15): state, slug, code, nickname, website, capital_city, capital_url, ...
## dbl   (3): admission_number, population, population_rank
## date  (1): admission_date

##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
dfStates17 <- data.frame(dfStates17)
```

#6. Summarize the variables in your new data set, using the summary command.

```
summary(dfStates17)
```

```
##     state               slug               code             nickname
##  Length:50          Length:50          Length:50          Length:50
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##    website          admission_date       admission_number capital_city
##  Length:50          Min.   :1787-12-07   Min.   : 1.00    Length:50
##  Class :character   1st Qu.:1790-08-06   1st Qu.:13.25    Class :character
##  Mode  :character   Median :1836-10-05   Median :25.50    Mode  :character
##                     Mean   :1840-03-14   Mean   :25.50
##                     3rd Qu.:1874-03-24   3rd Qu.:37.75
```

```
##                    Max.   :1959-08-21   Max.   :50.00
##  capital_url         population       population_rank constitution_url
##  Length:50          Min.   :  582658   Min.   : 1.00   Length:50
##  Class :character   1st Qu.: 1857857   1st Qu.:13.25   Class :character
##  Mode  :character   Median : 4510382   Median :25.50   Mode  :character
##                     Mean   : 6309648   Mean   :25.50
##                     3rd Qu.: 6901760   3rd Qu.:37.75
##                     Max.   :38332521   Max.   :50.00
##  state_flag_url     state_seal_url     map_image_url
##  Length:50          Length:50          Length:50
##  Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character
##
##
##
##  landscape_background_url skyline_background_url twitter_url
##  Length:50                Length:50              Length:50
##  Class :character         Class :character       Class :character
##  Mode  :character         Mode  :character       Mode  :character
##
##
##
##  facebook_url
##  Length:50
##  Class :character
##  Mode  :character
##
##
##
```

#7. The data you now have stored in dfStates17 were collected in 2017. As such,
#about 40 years passed between the two data collections. Calculate the total 2017
#population of the U.S. in dfStates17 by adding together the populations of each of
#the individual states. Store the result in a new variable called totalPop17.

```
totalPop17 <- sum(dfStates17[,'population'])
totalPop17
```

```
## [1] 315482390
```

#8. Create and interpret a ratio of totalPop77 to totalPop17. Check to ensure that the #result makes sense!

```
ratio <- totalPop77/totalPop17
ratio
```

```
## [1] 0.0006730043
```

#End of first breakout

#Create a function that, given population and area, calculates population density by dividing a population value by an area value. Here is the core of the function:

```
popDensity <- function (pop, area) {
  # Add your code below here:
  # Next, divide pop by area and store the result in a
  # variable called popDens
  popDens <- pop/area

  return(popDens) # This provides the function's output
}
```

#9. After you finish your function, make sure to run all of the lines of code in it so that the function becomes known to R.

#10. Make a fresh copy of state.x77 into dfStates77

```
dfStates77 <- data.frame(state.x77)
dfStates77
```

```
##                Population Income Illiteracy Life.Exp Murder HS.Grad Frost
## Alabama              3615   3624        2.1    69.05   15.1    41.3    20
## Alaska                365   6315        1.5    69.31   11.3    66.7   152
## Arizona              2212   4530        1.8    70.55    7.8    58.1    15
## Arkansas             2110   3378        1.9    70.66   10.1    39.9    65
## California          21198   5114        1.1    71.71   10.3    62.6    20
## Colorado             2541   4884        0.7    72.06    6.8    63.9   166
## Connecticut          3100   5348        1.1    72.48    3.1    56.0   139
## Delaware              579   4809        0.9    70.06    6.2    54.6   103
## Florida              8277   4815        1.3    70.66   10.7    52.6    11
## Georgia              4931   4091        2.0    68.54   13.9    40.6    60
## Hawaii                868   4963        1.9    73.60    6.2    61.9     0
## Idaho                 813   4119        0.6    71.87    5.3    59.5   126
## Illinois            11197   5107        0.9    70.14   10.3    52.6   127
## Indiana              5313   4458        0.7    70.88    7.1    52.9   122
## Iowa                 2861   4628        0.5    72.56    2.3    59.0   140
## Kansas               2280   4669        0.6    72.58    4.5    59.9   114
## Kentucky             3387   3712        1.6    70.10   10.6    38.5    95
## Louisiana            3806   3545        2.8    68.76   13.2    42.2    12
## Maine                1058   3694        0.7    70.39    2.7    54.7   161
## Maryland             4122   5299        0.9    70.22    8.5    52.3   101
## Massachusetts        5814   4755        1.1    71.83    3.3    58.5   103
## Michigan             9111   4751        0.9    70.63   11.1    52.8   125
## Minnesota            3921   4675        0.6    72.96    2.3    57.6   160
## Mississippi          2341   3098        2.4    68.09   12.5    41.0    50
## Missouri             4767   4254        0.8    70.69    9.3    48.8   108
## Montana               746   4347        0.6    70.56    5.0    59.2   155
## Nebraska             1544   4508        0.6    72.60    2.9    59.3   139
## Nevada                590   5149        0.5    69.03   11.5    65.2   188
## New Hampshire         812   4281        0.7    71.23    3.3    57.6   174
## New Jersey           7333   5237        1.1    70.93    5.2    52.5   115
## New Mexico           1144   3601        2.2    70.32    9.7    55.2   120
## New York            18076   4903        1.4    70.55   10.9    52.7    82
## North Carolina       5441   3875        1.8    69.21   11.1    38.5    80
## North Dakota          637   5087        0.8    72.78    1.4    50.3   186
## Ohio                10735   4561        0.8    70.82    7.4    53.2   124
## Oklahoma             2715   3983        1.1    71.42    6.4    51.6    82
```

```
## Oregon              2284   4660        0.6    72.13    4.2    60.0    44
## Pennsylvania       11860   4449        1.0    70.43    6.1    50.2   126
## Rhode Island         931   4558        1.3    71.90    2.4    46.4   127
## South Carolina      2816   3635        2.3    67.96   11.6    37.8    65
## South Dakota         681   4167        0.5    72.08    1.7    53.3   172
## Tennessee           4173   3821        1.7    70.11   11.0    41.8    70
## Texas              12237   4188        2.2    70.90   12.2    47.4    35
## Utah                1203   4022        0.6    72.90    4.5    67.3   137
## Vermont              472   3907        0.6    71.64    5.5    57.1   168
## Virginia            4981   4701        1.4    70.08    9.5    47.8    85
## Washington          3559   4864        0.6    71.72    4.3    63.5    32
## West Virginia       1799   3617        1.4    69.48    6.7    41.6   100
## Wisconsin           4589   4468        0.7    72.48    3.0    54.5   149
## Wyoming              376   4566        0.6    70.29    6.9    62.9   173
##                   Area
## Alabama          50708
## Alaska          566432
## Arizona         113417
## Arkansas         51945
## California      156361
## Colorado        103766
## Connecticut       4862
## Delaware          1982
## Florida          54090
## Georgia          58073
## Hawaii            6425
## Idaho            82677
## Illinois         55748
## Indiana          36097
## Iowa             55941
## Kansas           81787
## Kentucky         39650
## Louisiana        44930
## Maine            30920
## Maryland          9891
## Massachusetts     7826
## Michigan         56817
## Minnesota        79289
## Mississippi      47296
## Missouri         68995
## Montana         145587
## Nebraska         76483
## Nevada          109889
## New Hampshire     9027
## New Jersey        7521
## New Mexico      121412
## New York         47831
## North Carolina   48798
## North Dakota     69273
## Ohio             40975
## Oklahoma         68782
## Oregon           96184
## Pennsylvania     44966
## Rhode Island      1049
```

```
## South Carolina  30225
## South Dakota    75955
## Tennessee       41328
## Texas          262134
## Utah            82096
## Vermont          9267
## Virginia        39780
## Washington      66570
## West Virginia   24070
## Wisconsin       54464
## Wyoming         97203
```

#11. Store the population vector in a variable called tempPop. Adjust the tempPop as needed (based on your analysis at the end of the first breakout)

```
tempPop <- dfStates77[,'Population'] * 1000
tempPop
```

```
##  [1]  3615000   365000  2212000  2110000 21198000  2541000  3100000   579000
##  [9]  8277000  4931000   868000   813000 11197000  5313000  2861000  2280000
## [17]  3387000  3806000  1058000  4122000  5814000  9111000  3921000  2341000
## [25]  4767000   746000  1544000   590000   812000  7333000  1144000 18076000
## [33]  5441000   637000 10735000  2715000  2284000 11860000   931000  2816000
## [41]   681000  4173000 12237000  1203000   472000  4981000  3559000  1799000
## [49]  4589000   376000
```

#12. Store the area vector in a variable, called tempArea

```
tempArea <- dfStates77[,'Area']
tempArea
```

```
##  [1]  50708 566432 113417  51945 156361 103766   4862   1982  54090  58073
## [11]   6425  82677  55748  36097  55941  81787  39650  44930  30920   9891
## [21]   7826  56817  79289  47296  68995 145587  76483 109889   9027   7521
## [31] 121412  47831  48798  69273  40975  68782  96184  44966   1049  30225
## [41]  75955  41328 262134  82096   9267  39780  66570  24070  54464  97203
```

#13. Now use tempPop and tempArea to call your function:popDensity(tempPop, tempArea)

```
popDensity(tempPop, tempArea)
```

```
##  [1]  71.2905261   0.6443845  19.5032491  40.6198864 135.5708904  24.4877898
##  [7] 637.5976964 292.1291625 153.0227399  84.9103714 135.0972763   9.8334482
## [13] 200.8502547 147.1867468  51.1431687  27.8772910  85.4224464  84.7095482
## [19]  34.2173351 416.7424932 742.9082545 160.3569354  49.4520047  49.4967862
## [25]  69.0919632   5.1240839  20.1874926   5.3690542  89.9523651 975.0033240
## [31]   9.4224624 377.9139052 111.5004713   9.1955019 261.9890177  39.4725364
## [37]  23.7461532 263.7548370 887.5119161  93.1679074   8.9658350 100.9727062
## [43]  46.6822312  14.6535763  50.9334197 125.2136752  53.4625207  74.7403407
## [49]  84.2574912   3.8681934
```

#14. Store the results from the previous task in a column of the dfStates77 dataframe, called popDensity.

```
dfStates77$popDensity <- popDensity(tempPop,    tempArea)
dfStates77
```

```
##                Population Income Illiteracy Life.Exp Murder HS.Grad Frost
## Alabama              3615   3624        2.1    69.05   15.1    41.3    20
## Alaska                365   6315        1.5    69.31   11.3    66.7   152
## Arizona              2212   4530        1.8    70.55    7.8    58.1    15
## Arkansas             2110   3378        1.9    70.66   10.1    39.9    65
## California          21198   5114        1.1    71.71   10.3    62.6    20
## Colorado             2541   4884        0.7    72.06    6.8    63.9   166
## Connecticut          3100   5348        1.1    72.48    3.1    56.0   139
## Delaware              579   4809        0.9    70.06    6.2    54.6   103
## Florida              8277   4815        1.3    70.66   10.7    52.6    11
## Georgia              4931   4091        2.0    68.54   13.9    40.6    60
## Hawaii                868   4963        1.9    73.60    6.2    61.9     0
## Idaho                 813   4119        0.6    71.87    5.3    59.5   126
## Illinois            11197   5107        0.9    70.14   10.3    52.6   127
## Indiana              5313   4458        0.7    70.88    7.1    52.9   122
## Iowa                 2861   4628        0.5    72.56    2.3    59.0   140
## Kansas               2280   4669        0.6    72.58    4.5    59.9   114
## Kentucky             3387   3712        1.6    70.10   10.6    38.5    95
## Louisiana            3806   3545        2.8    68.76   13.2    42.2    12
## Maine                1058   3694        0.7    70.39    2.7    54.7   161
## Maryland             4122   5299        0.9    70.22    8.5    52.3   101
## Massachusetts        5814   4755        1.1    71.83    3.3    58.5   103
## Michigan             9111   4751        0.9    70.63   11.1    52.8   125
## Minnesota            3921   4675        0.6    72.96    2.3    57.6   160
## Mississippi          2341   3098        2.4    68.09   12.5    41.0    50
## Missouri             4767   4254        0.8    70.69    9.3    48.8   108
## Montana               746   4347        0.6    70.56    5.0    59.2   155
## Nebraska             1544   4508        0.6    72.60    2.9    59.3   139
## Nevada                590   5149        0.5    69.03   11.5    65.2   188
## New Hampshire         812   4281        0.7    71.23    3.3    57.6   174
## New Jersey           7333   5237        1.1    70.93    5.2    52.5   115
## New Mexico           1144   3601        2.2    70.32    9.7    55.2   120
## New York            18076   4903        1.4    70.55   10.9    52.7    82
## North Carolina       5441   3875        1.8    69.21   11.1    38.5    80
## North Dakota          637   5087        0.8    72.78    1.4    50.3   186
## Ohio                10735   4561        0.8    70.82    7.4    53.2   124
## Oklahoma             2715   3983        1.1    71.42    6.4    51.6    82
## Oregon               2284   4660        0.6    72.13    4.2    60.0    44
## Pennsylvania        11860   4449        1.0    70.43    6.1    50.2   126
## Rhode Island          931   4558        1.3    71.90    2.4    46.4   127
## South Carolina       2816   3635        2.3    67.96   11.6    37.8    65
## South Dakota          681   4167        0.5    72.08    1.7    53.3   172
## Tennessee            4173   3821        1.7    70.11   11.0    41.8    70
## Texas               12237   4188        2.2    70.90   12.2    47.4    35
## Utah                 1203   4022        0.6    72.90    4.5    67.3   137
## Vermont               472   3907        0.6    71.64    5.5    57.1   168
## Virginia             4981   4701        1.4    70.08    9.5    47.8    85
## Washington           3559   4864        0.6    71.72    4.3    63.5    32
## West Virginia        1799   3617        1.4    69.48    6.7    41.6   100
## Wisconsin            4589   4468        0.7    72.48    3.0    54.5   149
```

```
## Wyoming              376   4566        0.6    70.29    6.9    62.9   173
##                   Area  popDensity
## Alabama          50708  71.2905261
## Alaska          566432   0.6443845
## Arizona         113417  19.5032491
## Arkansas         51945  40.6198864
## California      156361 135.5708904
## Colorado        103766  24.4877898
## Connecticut       4862 637.5976964
## Delaware          1982 292.1291625
## Florida          54090 153.0227399
## Georgia          58073  84.9103714
## Hawaii            6425 135.0972763
## Idaho            82677   9.8334482
## Illinois         55748 200.8502547
## Indiana          36097 147.1867468
## Iowa             55941  51.1431687
## Kansas           81787  27.8772910
## Kentucky         39650  85.4224464
## Louisiana        44930  84.7095482
## Maine            30920  34.2173351
## Maryland          9891 416.7424932
## Massachusetts     7826 742.9082545
## Michigan         56817 160.3569354
## Minnesota        79289  49.4520047
## Mississippi      47296  49.4967862
## Missouri         68995  69.0919632
## Montana         145587   5.1240839
## Nebraska         76483  20.1874926
## Nevada          109889   5.3690542
## New Hampshire     9027  89.9523651
## New Jersey        7521 975.0033240
## New Mexico      121412   9.4224624
## New York         47831 377.9139052
## North Carolina   48798 111.5004713
## North Dakota     69273   9.1955019
## Ohio             40975 261.9890177
## Oklahoma         68782  39.4725364
## Oregon           96184  23.7461532
## Pennsylvania     44966 263.7548370
## Rhode Island      1049 887.5119161
## South Carolina   30225  93.1679074
## South Dakota     75955   8.9658350
## Tennessee        41328 100.9727062
## Texas           262134  46.6822312
## Utah             82096  14.6535763
## Vermont           9267  50.9334197
## Virginia         39780 125.2136752
## Washington       66570  53.4625207
## West Virginia    24070  74.7403407
## Wisconsin        54464  84.2574912
## Wyoming          97203   3.8681934
```

#15. Use which.max( ) and which.min( ) to reveal which is the most densely populated and which is the

least densely populated state. #Make sure that you understand the number that is revealed as well as the name of the state.

```
dfStates77[which.max(dfStates77$popDensity),]
```

```
##            Population Income Illiteracy Life.Exp Murder HS.Grad Frost Area
## New Jersey       7333   5237        1.1    70.93    5.2    52.5   115 7521
##            popDensity
## New Jersey   975.0033
```

```
dfStates77[which.min(dfStates77$popDensity),]
```

```
##        Population Income Illiteracy Life.Exp Murder HS.Grad Frost   Area
## Alaska        365   6315        1.5    69.31   11.3    66.7   152 566432
##        popDensity
## Alaska  0.6443845
```

#16. Using tidyverse, sort the dataframe using the popDensity attribute, then using
#the slice function, show the first row in the sorted database.

```
library('tidyverse')
sortedDF <- dfStates77 %>% arrange(popDensity)
sortedDF <- slice(sortedDF, 1)
sortedDF
```

```
##        Population Income Illiteracy Life.Exp Murder HS.Grad Frost   Area
## Alaska        365   6315        1.5    69.31   11.3    66.7   152 566432
##        popDensity
## Alaska  0.6443845
```

#17. How was the dataframe sorted (was the minimum first or the maximum)?

```
#It was the minimum first.
```