PH251D Fall 2018 - Project 1

FirstName MI LastName

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Create a project folder called `project1` on your computer. You will put all your Project 1 files in this folder.

Go to my GitHub site at https://github.com/taragonmd/data.

Go into the `project1` folder.

Download this Rmarkdown template (`PH251D2018_LastName_Project1.Rmd`) and edit. Use R Markdown to demonstrate the following skills:

1. Using the `source` function

Download the `problem1.R` file and save to the `project1` folder. Run the program file (problem1.r) using the 'source' command. Show the R code chunk and results below.

```
source('problem1.R')
```

```
##      [,1] [,2]
## [1,]    1    3
## [2,]    2    4
```

2. Read an ASCII data set

The Evans data set (`evans.txt`) is here: https://github.com/taragonmd/data.

Alternatively, here is the raw Evans data set: https://raw.githubusercontent.com/taragonmd/data/master/evans.txt.

Demonstrate reading the Evans data file (evans.txt) to create a data frame, and use the `str` function to explore the structure of the data set. Show the R code chunk and results below.

```
edat <- read.table('https://raw.githubusercontent.com/taragonmd/data/master/evans.txt',
sep='', header=TRUE)
str(edat)
```

```
## 'data.frame':    609 obs. of  12 variables:
##  $ id : int  21 31 51 71 74 91 111 131 141 191 ...
##  $ chd: int  0 0 1 0 0 0 1 0 0 0 ...
##  $ cat: int  0 0 1 1 0 0 0 0 0 0 ...
##  $ age: int  56 43 56 64 49 46 52 63 42 55 ...
##  $ chl: int  270 159 201 179 243 252 179 217 176 250 ...
##  $ smk: int  0 1 1 1 1 1 1 0 1 0 ...
##  $ ecg: int  0 0 1 0 0 0 1 0 0 1 ...
##  $ dbp: int  80 74 112 100 82 88 80 92 76 114 ...
##  $ sbp: int  138 128 164 200 145 142 128 135 114 182 ...
##  $ hpt: int  0 0 1 1 0 0 0 0 0 1 ...
##  $ ch : int  0 0 1 1 0 0 0 0 0 0 ...
##  $ cc : int  0 0 201 179 0 0 0 0 0 0 ...
```

3. Discretizing a continuous variable into a categorical variable

Total cholesterol levels less than 200 milligrams per deciliter (mg/dL) are considered desirable (**normal**) for adults. A reading between 200 and 239 mg/dL is considered **borderline high** and a reading of 240 mg/dL

and above is considered **high**.[1]

The Evan data dictionary is in Appendix D of the PHDSwR book. Convert total cholesterol variable (`chl`) into a categorical variable (factor) with the three levels described above.

```
edat$cholcat <- cut(edat$chl, breaks=c(0,200,240,400),right=FALSE)
table(edat$cholcat)
```

```
##
##   [0,200) [200,240) [240,400)
##       245       231       133
```

4. Working with dates and times

President John F. Kennedy was assassinated on "November 22, 1963". Convert this character string into a R date object. Show how to use R to display (a) the Julian date; (b) the day of the week, and (c) the week of the year.

```
jfk <- as.Date('November 22, 1963', format = '%B %d, %Y')
julian(jfk)
```

```
## [1] -2232
## attr(,"origin")
## [1] "1970-01-01"
```

```
weekdays(jfk)
```

```
## [1] "Friday"
```

```
format(jfk, format='%U') # week of the year (00-53) Sun
```

```
## [1] "46"
```

```
format(jfk, format='%V') # week of the year (01-53) Mon
```

```
## [1] "47"
```

```
format(jfk, format='%W') # week of the year (00-53) Mon
```

```
## [1] "46"
```

5. Simple two-way analysis

Create a simple 2x2 table of smoking (`smk`) and coronary heart disease (`chd`). Use the `fisher.test` on this 2x2 table and describe your findings.

```
(tab <- xtabs(~smk + chd, data = edat))
```

```
##    chd
## smk   0   1
##   0 205  17
##   1 333  54
```

```
fisher.test(tab)
```

```
##
##  Fisher's Exact Test for Count Data
##
## data:  tab
```

[1] Source: https://www.medicalnewstoday.com/articles/315900.php

```
## p-value = 0.02512
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  1.079813 3.697097
## sample estimates:
## odds ratio
##   1.953491
```

6. Write your own function

Now, write a function to calculate the odds ratio of your 2x2 table above.

```
riskOR <- function(x){
  risk1.odds <- x[2,2]/x[2,1]
  risk0.odds <- x[1,2]/x[1,1]
  return(risk1.odds/risk0.odds)
}
riskOR(tab)
```

```
## [1] 1.955485
```

7. Nested `for` loops

Write a nested `for` loops to create a mulitiplication table for the numbers 1 to 10.

```
x <- 1:10
mtab <- matrix(NA, 10, 10)
for(i in x){
  for(j in x){
    mtab[i, j] <- x[i] * x[j]
  }
}
mtab
```

```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
##  [1,]    1    2    3    4    5    6    7    8    9    10
##  [2,]    2    4    6    8   10   12   14   16   18    20
##  [3,]    3    6    9   12   15   18   21   24   27    30
##  [4,]    4    8   12   16   20   24   28   32   36    40
##  [5,]    5   10   15   20   25   30   35   40   45    50
##  [6,]    6   12   18   24   30   36   42   48   54    60
##  [7,]    7   14   21   28   35   42   49   56   63    70
##  [8,]    8   16   24   32   40   48   56   64   72    80
##  [9,]    9   18   27   36   45   54   63   72   81    90
## [10,]   10   20   30   40   50   60   70   80   90   100
```

8. Create a simple graph

From the Evans data create a histogram of the total cholesterol (`chl`). Label with a title and axis labels. Output to a PNG file using the `png` function.

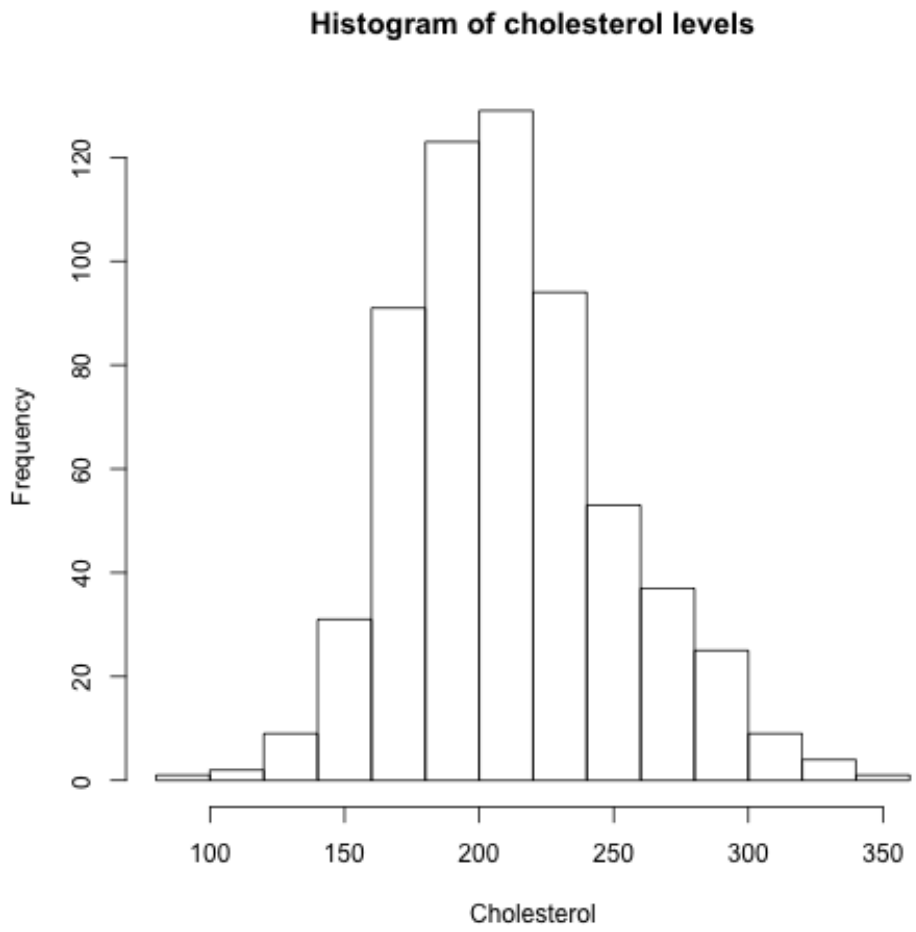
```
png(file = "myplot.png")
  hist(edat$chl, xlab='Cholesterol', main='Histogram of cholesterol levels')
dev.off()
```

```
## pdf
##   2
```

9. Display PNG file in your Rmarkdown document

Using Rmarkdown syntax, display the PNG you created above.

```
library(knitr)
include_graphics('myplot.png')
```



10. Using regular expressions

Here are the California counties: https://github.com/taragonmd/data/blob/master/calcounty.txt

Remove the "California" entry.

Use regular expressions to identify and display the County names that start with two or three letters followed by a space (e.g., `"San "`).

```
cac <-
scan('https://raw.githubusercontent.com/taragonmd/data/master/calcounty.txt',
what="")
cac <- cac[cac!="California"]
grep("^[[:alpha:]][[:alpha:]].?[[:space:]]", cac, value = TRUE)
```

```
##  [1] "Del Norte"       "El Dorado"       "Los Angeles"
##  [4] "San Benito"      "San Bernardino"  "San Diego"
##  [7] "San Francisco"   "San Joaquin"     "San Luis Obispo"
```

```
## [10] "San Mateo"
```