R Homework Number 8

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Statistics 5193

*Note: this document was created using R Markdown.

```
Question 1a.
```

```
help(source)
setwd("~/Documents/data_science/r_stat_5193/scripts")
source("Day8Script.R")
roster
ls()
```

```
##
       Firstname
                  Lastname Math Science English score grade
## 6
         Cheryl
                   Cushing 512
                                     85
                                             28 0.35
                                                          C
## 1
                     Davis 502
                                     95
                                             25 0.56
                                                          В
           John
## 9
           Joel
                   England 573
                                     89
                                             27 0.70
                                                          В
## 4
          David
                     Jones 358
                                     82
                                             15 -1.16
## 8
                      Knox 625
                                     95
                                             30 1.34
           Greg
                                                          Α
## 5
         Janice Markhammer 495
                                     75
                                             20 -0.63
                                                          D
## 3 Bullwinkle
                     Moose 412
                                     80
                                             18 -0.86
                                                          D
## 10
           Mary
                   Rayburn 522
                                     86
                                             18 -0.18
                                                          C
## 2
         Angela
                  Williams 600
                                     99
                                             22 0.92
                                                          Α
                 Ytzrhak 410
## 7
         Reuven
                                     80
                                             15 -1.05
                                                          F
## [1] "col"
                    "English"
                               "First"
                                           "Firstname" "Last"
                               "mu"
                                                       "n"
## [6] "Lastname"
                    "Math"
                                           "mvn.data"
## [11] "name"
                    "rho"
                               "roster"
                                           "Science"
                                                       "score"
## [16] "Sigma"
                    "Student"
                               "sums"
                                           "t.data"
## [21] "y"
                    "z"
```

Question 1b.

```
## [1] 0.56 0.92 -0.86 -1.16 -0.63 0.35 -1.05 1.34 0.70 -0.18

roster$score
## [1] 0.35 0.56 0.70 -1.16 1.34 -0.63 -0.86 -0.18 0.92 -1.05

"roster <- roster[order(Lastname,Firstname),]"
## [1] "roster <- roster[order(Lastname,Firstname),]"</pre>
```

Question 1c.

```
y <- quantile(score, c(.75,.25))</pre>
roster$`Easy Grade`[roster$score > y[1]] <- "A"</pre>
roster$`Easy Grade`[roster$score < y[1] & roster$score >= y[2]] <- "B"</pre>
roster$`Easy Grade`[roster$score < y[2]] <- "C"</pre>
roster
##
       Firstname
                    Lastname Math Science English score grade Easy Grade
## 6
          Cheryl
                     Cushing 512
                                                28 0.35
                                                              C
                                        85
                                        95
## 1
            John
                       Davis
                              502
                                                25 0.56
                                                              В
                                                                          В
                                                27 0.70
                                                              В
                                                                          Α
## 9
                     England
                              573
                                        89
            Joel
## 4
           David
                       Jones
                              358
                                        82
                                                15 -1.16
                                                              F
                                                                          C
## 8
            Greg
                        Knox 625
                                        95
                                                30 1.34
                                                              Α
                                                                          Α
## 5
          Janice Markhammer
                              495
                                        75
                                                20 -0.63
                                                                          В
                                                              D
## 3
      Bullwinkle
                       Moose 412
                                        80
                                                18 -0.86
                                                              D
                                                                          C
## 10
            Mary
                     Rayburn
                              522
                                        86
                                                18 -0.18
                                                              C
                                                                          В
## 2
          Angela
                    Williams
                              600
                                        99
                                                22 0.92
                                                              Α
                                                                          Α
## 7
                     Ytzrhak 410
                                                15 -1.05
                                                              F
          Reuven
                                        80
```

Question 1d.

```
y <- quantile(Math, c(.75,.25))</pre>
roster$MathGrade[roster$Math > y[1]] <- "A"</pre>
roster$MathGrade[roster$Math < y[1] & roster$Math >= y[2]] <- "B"</pre>
roster$MathGrade[roster$Math < y[2]] <- "C"</pre>
roster
##
       Firstname
                    Lastname Math Science English score grade Easy Grade
## 6
          Cheryl
                     Cushing 512
                                        85
                                                28 0.35
                                                              C
## 1
                       Davis
                              502
                                        95
                                                 25 0.56
                                                              В
                                                                          В
            John
## 9
                                        89
                                                              В
            Joel
                     England
                             573
                                                27 0.70
                                                                          Α
## 4
                                                15 -1.16
                                                              F
                                                                          C
           David
                       Jones
                              358
                                        82
                        Knox 625
                                        95
                                                                          Α
## 8
            Greg
                                                30 1.34
                                                              Α
## 5
          Janice Markhammer
                              495
                                        75
                                                20 -0.63
                                                              D
                                                                          В
      Bullwinkle
                       Moose 412
                                        80
                                                18 -0.86
                                                              D
                                                                          C
## 3
## 10
                              522
                                        86
                                                18 -0.18
                                                              C
                                                                          В
            Mary
                     Rayburn
## 2
          Angela
                    Williams
                              600
                                        99
                                                22 0.92
                                                              Α
                                                                          Α
                                                                          C
## 7
                                                              F
          Reuven
                    Ytzrhak 410
                                        80
                                                15 -1.05
##
      MathGrade
## 6
               В
## 1
               В
## 9
               Α
               C
## 4
## 8
               Α
## 5
               В
## 3
               C
## 10
               В
## 2
               Α
               C
## 7
```

Question 1e.

```
roster_sort <- roster[order(-roster$Math),]</pre>
roster_sort
##
       Firstname
                    Lastname Math Science English score grade Easy Grade
## 8
                                       95
                                                30 1.34
            Greg
                        Knox
                              625
                                                             Α
                                       99
                                                                         Α
## 2
          Angela
                   Williams
                              600
                                                22 0.92
                                                             Α
## 9
            Joel
                    England
                              573
                                       89
                                                27 0.70
                                                             В
                                                                         Α
## 10
            Mary
                    Rayburn
                              522
                                                18 -0.18
                                                             C
                                                                         В
                                       86
## 6
          Cheryl
                    Cushing 512
                                       85
                                                28 0.35
                                                             C
                                                                         В
## 1
                                       95
                                                25 0.56
                                                             В
                                                                         В
            John
                       Davis
                              502
## 5
          Janice Markhammer
                              495
                                       75
                                                20 -0.63
                                                             D
                                                                         В
                                                                         C
## 3
      Bullwinkle
                                                18 -0.86
                                                             D
                       Moose 412
                                       80
## 7
                    Ytzrhak 410
                                       80
                                                15 -1.05
                                                             F
                                                                         C
          Reuven
                                                             F
                                                                         C
## 4
                       Jones 358
                                       82
                                                15 -1.16
           David
##
      MathGrade
## 8
## 2
              Α
## 9
              Α
## 10
              В
## 6
              В
## 1
              В
## 5
              В
## 3
              C
              C
## 7
## 4
              C
```

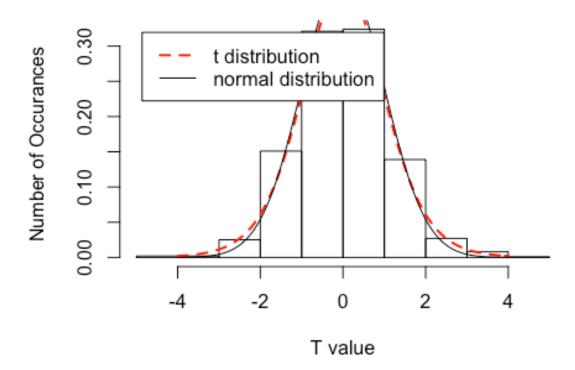
Question 1f.

```
full_name <- paste(roster_sort$Firstname, roster_sort$Lastname)</pre>
row.names(roster_sort) <- full_name</pre>
roster_sort_drop <- roster_sort[,c(-1,-2)]</pre>
roster_sort_drop
##
                      Math Science English score grade Easy Grade MathGrade
## Greg Knox
                                         30 1.34
                       625
                                 95
                                                       Α
## Angela Williams
                       600
                                 99
                                         22 0.92
                                                       Α
                                                                   Α
                                                                             Α
## Joel England
                       573
                                 89
                                         27 0.70
                                                       В
                                                                   Α
                                                                             Α
## Mary Rayburn
                       522
                                         18 -0.18
                                                       C
                                                                   В
                                                                             В
                                 86
## Cheryl Cushing
                                                                   В
                                                                             В
                       512
                                 85
                                         28 0.35
                                                       C
## John Davis
                                 95
                                                       В
                                                                   В
                                                                             В
                       502
                                         25 0.56
## Janice Markhammer 495
                                 75
                                                       D
                                                                   В
                                                                             В
                                         20 -0.63
                                                                   C
                                                                             C
## Bullwinkle Moose
                       412
                                 80
                                         18 -0.86
                                                       D
## Reuven Ytzrhak
                       410
                                 80
                                         15 -1.05
                                                       F
                                                                   C
                                                                             C
                                                                             C
## David Jones
                       358
                                 82
                                         15 -1.16
                                                       F
                                                                   C
```

Question 2.

```
t_data <- rt(1000,10)
hist(t_data,
     main = "Normal Approximation",
     ylab = "Number of Occurances",
     xlab = "T value",
     probability = T)
curve(dt(x, df = 10),
       xlim = c(-4,4),
       lwd = 2,
      1ty = 2,
       col = 'red',
       add = T)
curve(dnorm(x),
       xlim = c(-4,4),
       add = T)
legend(x="topleft",
      legend = c("t distribution", "normal distribution"),
lty = c(2,1), col = c('red', 'black'), lwd=c(2,1),
       inset = 0.05)
```

Normal Approximation

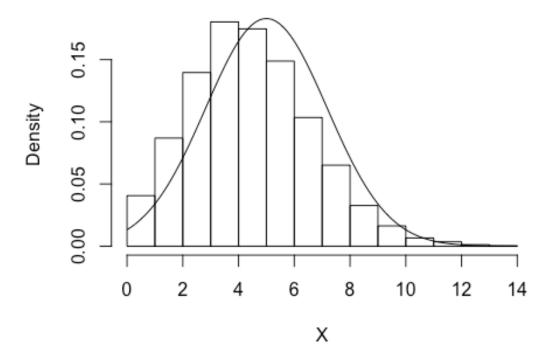


```
main = 'Binomial(100, .05)',
    xlab = 'X'
)

mu <- 100 * 0.05
sigma <- sqrt((100*0.05)*0.95)

curve(dnorm(x, mu, sigma), add = T)</pre>
```

Binomial(100, .05)



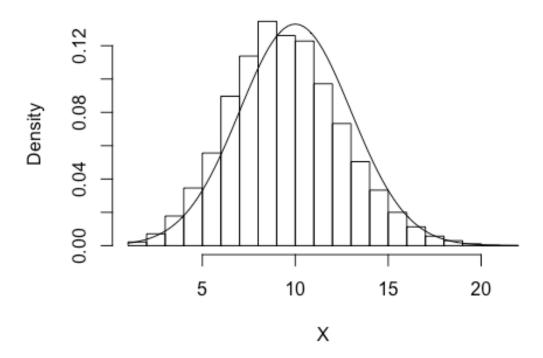
Question 3c.

```
hist(rbinom(10000, 100, 0.10),
    probability = T,
    main = 'Binomial(100, .10)',
    xlab = 'X'
)
```

```
mu <- 100 * 0.10
sigma <- sqrt((100*0.10)*0.90)

curve(dnorm(x, mu, sigma), add = T)</pre>
```

Binomial(100, .10)



Question 3d.

Yes, this seems reasonable based off the above plots.