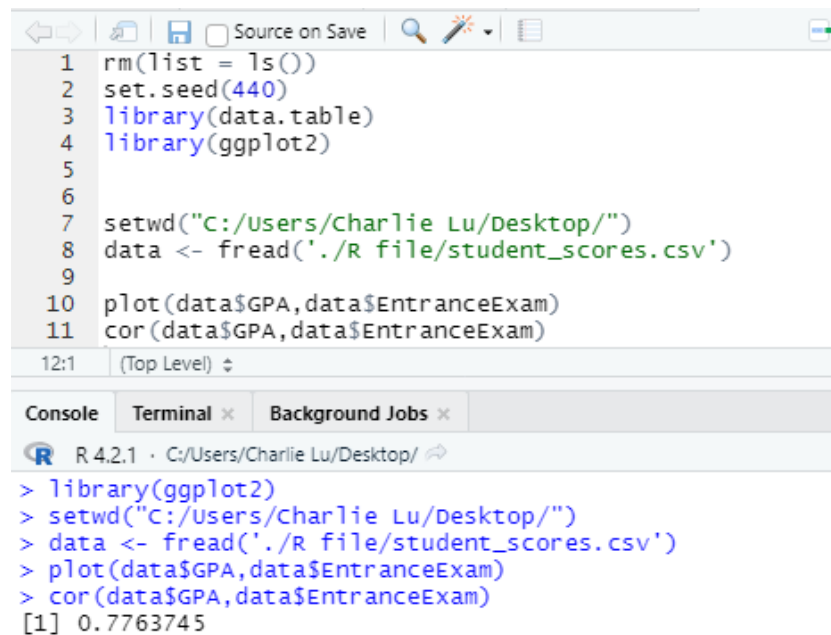


# STAT 440 Homework 9

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## 1 A



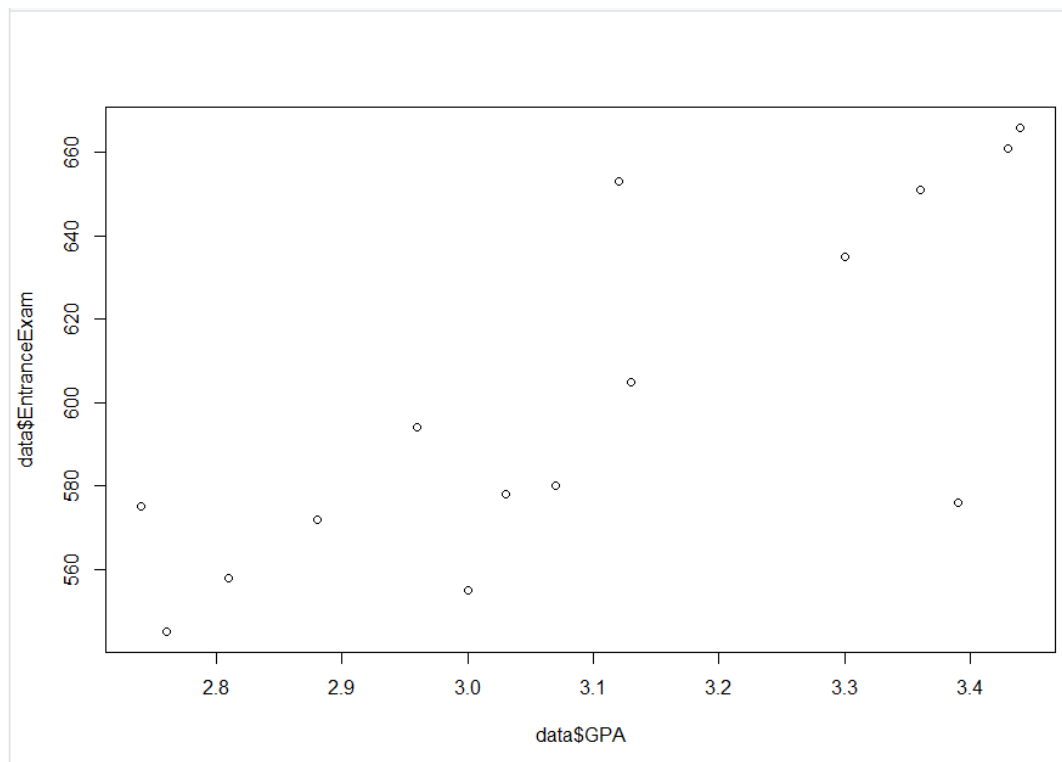
```
1 rm(list = ls())
2 set.seed(440)
3 library(data.table)
4 library(ggplot2)
5
6
7 setwd("C:/Users/Charlie Lu/Desktop/")
8 data <- fread('./R file/student_scores.csv')
9
10 plot(data$GPA, data$EntranceExam)
11 cor(data$GPA, data$EntranceExam)
```

12:1 (Top Level) ↕

Console Terminal × Background Jobs ×

R 4.2.1 · C:/Users/Charlie Lu/Desktop/ ↗

```
> library(ggplot2)
> setwd("C:/Users/Charlie Lu/Desktop/")
> data <- fread('./R file/student_scores.csv')
> plot(data$GPA, data$EntranceExam)
> cor(data$GPA, data$EntranceExam)
[1] 0.7763745
```



While not perfect, the correlation between GPA and exam score is indeed similar to the calculated correlation we got. The correlation is positive and less than perfect. Which is very similar to the plotted points, except for a few exceptions.

## 2 B

```
16 jackknife_vec = function(samples, est_func) {
17   #'
18   #' Function for performing jackknife estimation for
19   #' vector-valued functions
20   #'
21   #' @param samples vector of samples
22   #' @param est_func scalar-valued function
23
24   n = length(samples[,1])
25   jackknife_samps = sapply(
26     # for each index in the sample...
27     1:n,
28     # ...calculate the statistic at all but the current index
29     function(j) { est_func(samples[-j,]) }
30   )
31
32   # calculate the jackknife estimate
33   theta_est = mean(jackknife_samps)
34
35   # calculate the jackknife variance estimate
36   var_est = (
37     (n-1) / n * sum((jackknife_samps - theta_est)**2)
38   )
39
40   # calculate the jackknife bias estimate
41   bias_est = (
42     (n-1) * (theta_est - est_func(samples))
43   )
44
45   # return all three outputs
46   list(
47     theta_est,
48     bias_est,
49     var_est
50   )
51 }
52 est_function = function(a){
53   x = a[,1]
54   y = a[,2]
55   return(cor(x,y))
56 }
57 jackknife_vec(sample_set,est_function)
58
```

51:2 (Top Level) ↕

Console	Terminal ×	Background Jobs ×
R 4.2.1 · C:/Users/Charlie Lu/Desktop/ ↗		
+ return(cor(x,y))		
+ }		
> jackknife_vec(sample_set,est_function)		
[[1]]		
[1] 0.7759121		
[[2]]		
[1] -0.006473623		
[[3]]		
[1] 0.02031156		