HW3_Do_Quyen

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Problem 4

Take away from good programming style

Problem 5

Problem 6

```
data <- readRDS("./03_good_programming_R_functions/HW3_data.rds")

#Function to calculate mean, sd and correlation
# of 2 vectors and return the results in a data frame
summarizeVectors <- function (dev1,dev2)
{
  mean_dev1 <- mean(dev1)
  mean_dev2 <- mean(dev2)
  sd_dev1 <- sd(dev1)
  sd_dev2 <- sd(dev2)
  correlation <- cor(dev1,dev2)
  df <- data.frame(mean_dev1,mean_dev2,sd_dev1,sd_dev2,correlation)

  return(df)
}



#a. Create a single table of the means, sd, and correlation for each of the 13 Observers in data.rds

##Create a dataframe to hold the results
Observers_summary <- data.frame(matrix(ncol = 6,nrow = 0))
names(Observers_summary) <- c("Observer","mean_dev1","mean_dev2","sd_dev1","sd_dev2","correlation")

##Loop through each observer's data to calculate the necessary statistics
for (observer in unique(data$Observer))
{
  current_dev1 <-  data$dev1[which(data$Observer==observer)]
  current_dev2 <-  data$dev2[which(data$Observer==observer)]
  result <- summarizeVectors(current_dev1,current_dev2)
  result$Observer <- observer
  Observers_summary <- rbind(Observers_summary,result)

}
##Rearrange the order of columns in the summary table
Observers_summary <- Observers_summary[,c(6,1:5)]
```

```r
#b. Create a boxplot of all the means to compare the spread of means from dev1 to dev2
par(mfrow=c(1,2))
boxplot(Observers_summary$mean_dev1,main="All means from dev1",ylim=c(54.260,54.270))
boxplot(Observers_summary$mean_dev2,main="All means from dev2",ylim=c(47.830,47.840))
```

TODO: comment on the spread of means

```r
#c. Create a boxplot of all means to compare the spread of sds from dev1 to dev2
par(mfrow=c(1,2))
boxplot(Observers_summary$sd_dev1,main="All sds from dev1",ylim=c(16.760,16.770))
boxplot(Observers_summary$sd_dev2,main="All sds from dev2",ylim=c(26.930,26.940))
```

TODO: comment on the spread of sds

Problem 7

Import and clean Blood Pressure data

```r
#Read in raw data from the url
url <- "https://www2.isye.gatech.edu/~jeffwu/wuhamadabook/data/BloodPressure.dat"
bloodPressure_raw <- read.csv(url,skip=1,header=T,sep=" ")

#Drop duplicate column
bloodPressure_raw$Day.1 <- NULL

#Gather all "dev" columns

bloodPressure_cleaned <- gather(bloodPressure_raw, key="Reading_By",value="Reading","Dev1","Dev2","Dev3
```

Summary tables

```r
#Show the first 10 rows of the cleaned data
kable(head(bloodPressure_cleaned,10),caption="First 10 rows of cleaned blood pressure data")
```

Table 1: First 10 rows of cleaned blood pressure data

Day	Reading_By	Reading
1	Dev1	133.34
2	Dev1	110.94
3	Dev1	118.54
4	Dev1	137.94
5	Dev1	139.52
6	Dev1	139.23
7	Dev1	117.96
8	Dev1	119.59
9	Dev1	116.12
10	Dev1	128.38

```r
#Create a summary table
kable(summary(bloodPressure_cleaned),caption="Blood Pressure Data Summary")
```

Table 2: Blood Pressure Data Summary

Day	Reading_By	Reading
Min. : 1	Length:90	Min. :110.8
1st Qu.: 4	Class :character	1st Qu.:125.5
Median : 8	Mode :character	Median :130.4
Mean : 8	NA	Mean :129.0
3rd Qu.:12	NA	3rd Qu.:134.3
Max. :15	NA	Max. :139.6

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Problem 8

Find solution to (1) using Newton's method

$$f(x) = 3^x - sin(x) + cos(5x) \tag{1}$$

```
#Code up function (1)
```