Assignment-2

Parth Vohra 102016044 3CS10

Q1) Code:

```
chest <- c(gold,silver,bronze)
print(sample(chest,10,replace = TRUE),prob = c(0.2,0.3,0.5))

sample(x=c("Success","Failure"),prob=c(.9,.1),size=10,replace=TRUE)
```

Ans:

```
Console   Terminal ×   Background Jobs ×
R 4.2.1 · ~/
> source("C:/Users/parth/OneDrive/Desktop/Sem 5/Probability Statistics (UCS410)/Lab_02/Q1.R")
 [1] NA NA 28  7 NA 24 10 39  5 42
>
```

Q2) Code:

```
#(a) Use an R simulation to estimate this for various n.
n = 1:50
p = numeric(50)
for (i in n)
{
  q = prod(1-(0:(i-1))/365)
  p[i] = 1-q
}
print(p)
```

Ans:

```
Console   Terminal ×   Background Jobs ×
R 4.2.1 · ~/
> #(a) Use an R simulation to estimate this for various n.
> n = 1:50
> p = numeric(50)
> for (i in n)
+ {
+   q = prod(1-(0:(i-1))/365)
+   p[i] = 1-q
+ }
> print(p)
 [1] 0.000000000 0.002739726 0.008204166 0.016355912 0.027135574 0.040462484 0.056235703 0.074335292 0.094623834 0.116948178 0.141141378 0.167024789
[13] 0.194410275 0.223102512 0.252901320 0.283604005 0.315007665 0.346911418 0.379118526 0.411438384 0.443688335 0.475695308 0.507297234 0.538344258
[25] 0.568699704 0.598240820 0.626859282 0.654461472 0.680968537 0.706316243 0.730454634 0.753347528 0.774971854 0.795316865 0.814383239 0.832182106
[37] 0.848734008 0.864067821 0.878219664 0.891231810 0.903151611 0.914030472 0.923922856 0.932885369 0.940975899 0.948252843 0.954774403 0.960597973
[49] 0.965779609 0.970373580
>
```

Q3) Code:

```
cloudy_rain <- 0.85
cloudy <- 0.4
rainy <- 0.2

rain_cloudy = (cloudy_rain * rainy)/cloudy
print(rain_cloudy)
```

Ans:

```
Console   Terminal ×   Background Jobs ×
R 4.2.1 · ~/
> source("C:/Users/parth/OneDrive/Desktop/Sem 5/Probability Statistics (UCS410)/Lab_02/Q3.R")
[1] 0.425
>
```

Q4) Code: a t0 g

```
library(datasets)
data(iris)
summary(iris)

#(a) Print first few rows of this dataset
print(head(iris,4))

#(b) Find the structure of this dataset.
str(data)

#(c) Find the range of the data regarding the sepal length of flowers.
sl <- iris$Sepal.Length
sw <- iris$Sepal.Width

print("Sepal Length")
#print(sl)
print("Sepal Width")
#print(sw)

#(d) Find the mean of the sepal length.
print(paste("Mean of Sepal Length",mean(sl)))

#(e) Find the median of the sepal length.
print(paste("Median of Sepal Length",median(sl)))

#(f) Find the first and the third quartiles and hence the interquartile range.
print(paste("First quartile is:",quantile(sl, 0.25))) #first quartile
print(paste("Third quartile is:",quantile(sl, 0.75))) # third quartile
#print(quantile(iris$Sepal.Length, 0.75) - quantile(iris$Sepal.Length, 0.25))
print(paste("Interquartile range is: ",IQR(sl)))

#(g) Find the standard deviation and variance.
print(paste("Standard Deviation is:",sd(sl)))
print(paste("Variance is:",var(sl)))
```

Ans: a to g

```
Console   Terminal ×   Background Jobs ×
R 4.2.1 · ~/
> source("C:/Users/parth/OneDrive/Desktop/Sem 5/Probability Statistics (UCS410)/Lab_02/Q4.R")
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
 int [1:150] 1 2 3 4 5 6 7 8 9 10 ...
[1] "Sepal Length"
[1] "Sepal Width"
[1] "Mean of Sepal Length 5.84333333333333"
[1] "Median of Sepal Length 5.8"
[1] "First quartile is: 5.1"
[1] "Third quartile is: 6.4"
[1] "Interquartile range is:  1.3"
[1] "Standard Deviation is: 0.828066127977863"
[1] "Variance is: 0.685693512304251"
[1] "Mean of Sepal Width 3.05733333333333"
[1] "Median of Sepal Width 3"
[1] "First quartile is: 2.8"
[1] "Third quartile is: 3.3"
[1] "Interquartile range is:  0.5"
[1] "Standard Deviation is: 0.435866284936698"
[1] "Variance is: 0.189979418344519"
[1] "Mean of Petal Length 3.758"
[1] "Median of Petal Length 4.35"
[1] "First quartile is: 1.6"
[1] "Third quartile is: 5.1"
[1] "Interquartile range is:  3.5"
[1] "Standard Deviation is: 1.76529823325947"
[1] "Variance is: 3.11627785234899"
[1] "Mean of Petal Width 1.19933333333333"
[1] "Median of Petal Width 1.3"
[1] "First quartile is: 0.3"
[1] "Third quartile is: 1.8"
[1] "Interquartile range is:  1.5"
[1] "Standard Deviation is: 0.762237668960347"
[1] "Variance is: 0.581006263982103"
  Sepal.Length    Sepal.Width     Petal.Length    Petal.Width          Species
 Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100   setosa    :50
 1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300   versicolor:50
 Median :5.800   Median :3.000   Median :4.350   Median :1.300   virginica :50
 Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
 3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
 Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
```

Code: for h and i

```
#(h) Try doing the above exercises for sepal.width, petal.length and petal.width.
#For sepal.width
print(paste("Mean of Sepal Width",mean(sw)))
print(paste("Median of Sepal Width",median(sw)))
print(paste("First quartile is:",quantile(sw, 0.25))) #first quartile
print(paste("Third quartile is:",quantile(sw, 0.75))) # third quartile
print(paste("Interquartile range is: ",IQR(sw)))
print(paste("Standard Deviation is:",sd(sw)))
print(paste("Variance is:",var(sw)))

#For petal.length
pl <- iris$Petal.Length
#print(pl)
print(paste("Mean of Petal Length",mean(pl)))
print(paste("Median of Petal Length",median(pl)))
print(paste("First quartile is:",quantile(pl, 0.25))) #first quartile
print(paste("Third quartile is:",quantile(pl, 0.75))) # third quartile
print(paste("Interquartile range is: ",IQR(pl)))
print(paste("Standard Deviation is:",sd(pl)))
print(paste("Variance is:",var(pl)))

# For petal.width
pw <- iris$Petal.Width
print(paste("Mean of Petal Width",mean(pw)))
print(paste("Median of Petal Width",median(pw)))
print(paste("First quartile is:",quantile(pw, 0.25))) #first quartile
print(paste("Third quartile is:",quantile(pw, 0.75))) # third quartile
print(paste("Interquartile range is: ",IQR(pw)))
print(paste("Standard Deviation is:",sd(pw)))
print(paste("Variance is:",var(pw)))

#(i) Use the built-in function summary on the dataset Iris.
print(summary(iris))
```

Ans: h and i

Console | Terminal | Background Jobs

R 4.2.1 · ~/

```
> source("C:/Users/parth/OneDrive/Desktop/Sem 5/Probability Statistics (UCS410)/Lab_02/Q4.R")
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
 int [1:150] 1 2 3 4 5 6 7 8 9 10 ...
[1] "Sepal Length"
[1] "Sepal Width"
[1] "Mean of Sepal Length 5.84333333333333"
[1] "Median of Sepal Length 5.8"
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[1] "Interquartile range is:  1.3"
[1] "Standard Deviation is: 0.828066127977863"
[1] "Variance is: 0.685693512304251"
[1] "Mean of Sepal Width 3.05733333333333"
[1] "Median of Sepal Width 3"
[1] "First quartile is: 2.8"
[1] "Third quartile is: 3.3"
[1] "Interquartile range is:  0.5"
[1] "Standard Deviation is: 0.435866284936698"
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[1] "Variance is: 3.11627785234899"
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  Sepal.Length    Sepal.Width     Petal.Length    Petal.Width          Species
 Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100   setosa    :50
 1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300   versicolor:50
 Median :5.800   Median :3.000   Median :4.350   Median :1.300   virginica :50
 Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
 3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
 Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
>
```

Q5) Code:

```r
#(5) R does not have a standard in-built function to calculate mode. So we create a user
#function to calculate mode of a data set in R. This function takes the vector as input
#and gives the mode value as output.

getmode <- function(v) {
  uniqv <- unique(v)
  uniqv[which.max(tabulate(match(v, uniqv)))]
}

# Create the vector with numbers.
v <- c(2,1,2,3,1,2,3,4,1,5,5,3,2,3)

# Calculate the mode using the user function.
result <- getmode(v)
print(paste("Mode of the data is:",result))

# Create the vector with characters.
charv <- c("o","it","the","it","it")

# Calculate the mode using the user function.
result <- getmode(charv)
print(paste("Mode of the data is:",result))
```

Ans:

```
Console   Terminal ×   Background Jobs ×
R 4.2.1 · ~/
> source("C:/Users/parth/OneDrive/Desktop/Sem 5/Probability Statistics (UCS410)/Lab_02/Q5.R")
[1] "Mode of the data is: 2"
[1] "Mode of the data is: it"
>
```