EXPERIMENT 4

Taniya Ahmed

21BDS0059

1. Installing packages

```
install.packages("modeest")
library(modeest)

df = mtcars
df
```

```
> head(df, 5)
                   mpg cyl disp  hp drat    wt  qsec vs
Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0
Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0
Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1
Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1
Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0
                  am gear carb
Mazda RX4          1    4    4
Mazda RX4 Wag      1    4    4
Datsun 710         1    4    1
Hornet 4 Drive     0    3    1
Hornet Sportabout  0    3    2
```

2. Statistical analysis

```
mean(df$mpg)
median(df$hp)
sd(df$drat)
var(df$wt)
sum(df$qsec)
IQR(df$disp)
```

```
> mean(df$mpg)
[1] 20.09062
> median(df$hp)
[1] 123
> sd(df$drat)
[1] 0.5346787
> var(df$wt)
[1] 0.957379
> sum(df$qsec)
[1] 571.16
> IQR(df$disp)
[1] 205.175
>
```

3. Mode calculation

```
calc_mode = function(x){
 mode = table(x)[which.max(table(x))]
 return (mode)
}
calc_mode(df$wt)
```

```
> calc_mode = function(x){
+   mode = table(x)[which.max(table(x))]
+   return (mode)
+ }
> calc_mode(df$wt)
3.44
   3
>
```

```
# using modeest library

mode = table(V3)[which.max(table(V3))]

mode = mfv(df$wt)
mode
```

```
> mode = table(V3)[which.max(table(V3))]
>
> mode = mfv(df$wt)
> mode
[1] 3.44
>
```

4. Probability in R

```
# discrete distribution
# poisson distribution
lam = mean(df$disp)
prob_four_cylinder  = dpois(4, lambda = lam)
print(prob_four_cylinder)
prob_atmost_4_cylinder = ppois(4, lambda = lam)
print(prob_atmost_4_cylinder)
poisson_sample = rpois(10, lambda = lam)
print(poisson_sample)
quantile_val = qpois(0.95, lambda = lam)
print(quantile_val)
```

```
> # discrete distribution
> # poisson distribution
> lam = mean(df$disp)
> prob_four_cylinder  = dpois(4, lambda = lam)
> print(prob_four_cylinder)
[1] 7.428595e-93
> prob_atmost_4_cylinder = ppois(4, lambda = lam)
> print(prob_atmost_4_cylinder)
[1] 7.559073e-93
> poisson_sample = rpois(10, lambda = lam)
> print(poisson_sample)
 [1] 229 217 255 231 211 255 258 226 232 217
> quantile_val = qpois(0.95, lambda = lam)
> print(quantile_val)
[1] 256
>
```

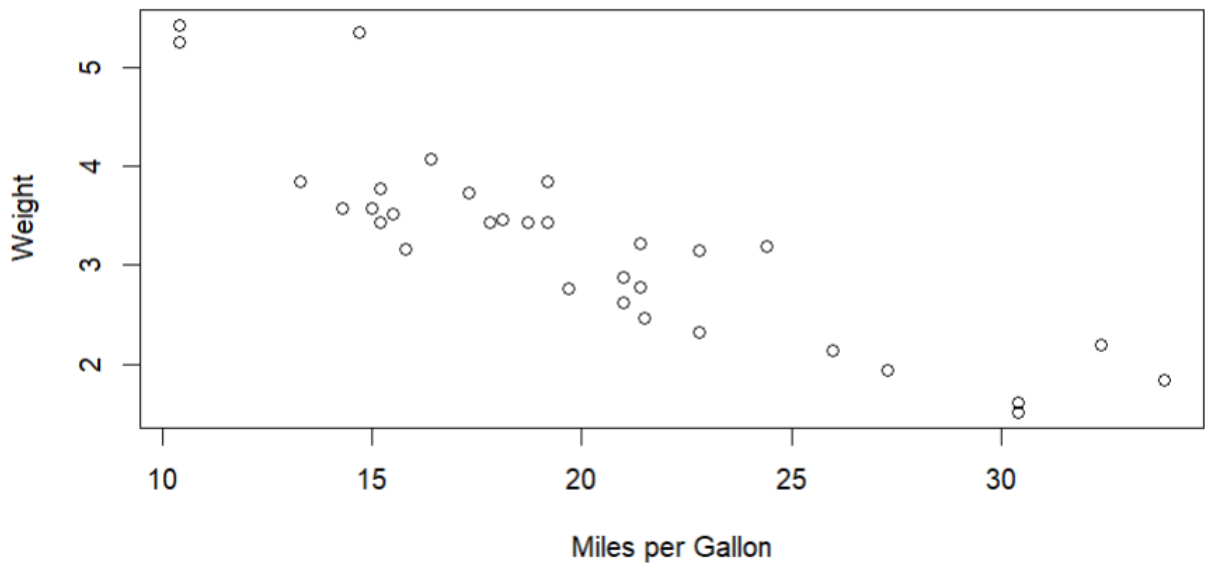
```
# continuous distribution
# normal distribution
mean_hp = mean(df$hp)
sd_hp = sd(df$hp)

prob_density_func = dnorm(20, mean = mean_hp, sd = sd_hp)
print(prob_density_func)
cum_density_func = pnorm(20, mean = mean_hp, sd = sd_hp)
print(cum_density_func)
normal_sample = rnorm(10, mean = mean_hp, sd = sd_hp)
print(normal_sample)
quant_val = qnorm(0.95, mean = mean_hp, sd = sd_hp)
print(quant_val)
```

```
> # continuous distribution
> # normal distribution
> mean_hp = mean(df$hp)
> sd_hp = sd(df$hp)
>
> prob_density_func = dnorm(20, mean = mean_hp, sd = sd_hp)
> print(prob_density_func)
[1] 0.001055446
> cum_density_func = pnorm(20, mean = mean_hp, sd = sd_hp)
> print(cum_density_func)
[1] 0.03231877
> normal_sample = rnorm(10, mean = mean_hp, sd = sd_hp)
> print(normal_sample)
 [1] 187.29288 141.26161  35.28234 112.78302  57.99320  62.44869 104.28784 215.57693 204.43275 154.32557
> quant_val = qnorm(0.95, mean = mean_hp, sd = sd_hp)
> print(quant_val)
[1] 259.4634
>
```

5. Plotting in R

```
plot(df$mpg, df$wt, xlab = "Miles per Gallon", ylab = "Weight")
```




```
hist(df$cyl, xlab = "Cylinder", main = "Histogram of Cylinder")
```