Date: 08/Feb/2024 EXPERIMENT – 04	SIMPLE LINEAR REGRESSION

AIM: To perform Simple Linear Regression and get the output with graphs

SOFTWARE REQUIRED: RStudio

R CODE:

```
rm(list=ls())
data <- mtcars
library(dplyr)
data <- sample_n(data,15)
library("ggplot2")
ggplot(data, aes(x=wt,y=mpg))+geom_point()
cor.test(data$wt,data$mpg)
slr = lm(mpg~wt, data)
summary (slr)
plot(slr$resid)
qqnorm(slr$resid)
mlr = lm(mpg~wt+gear,data)
summary(mlr)
plot(mlr$resid)
qqnorm(mlr$resid)
```


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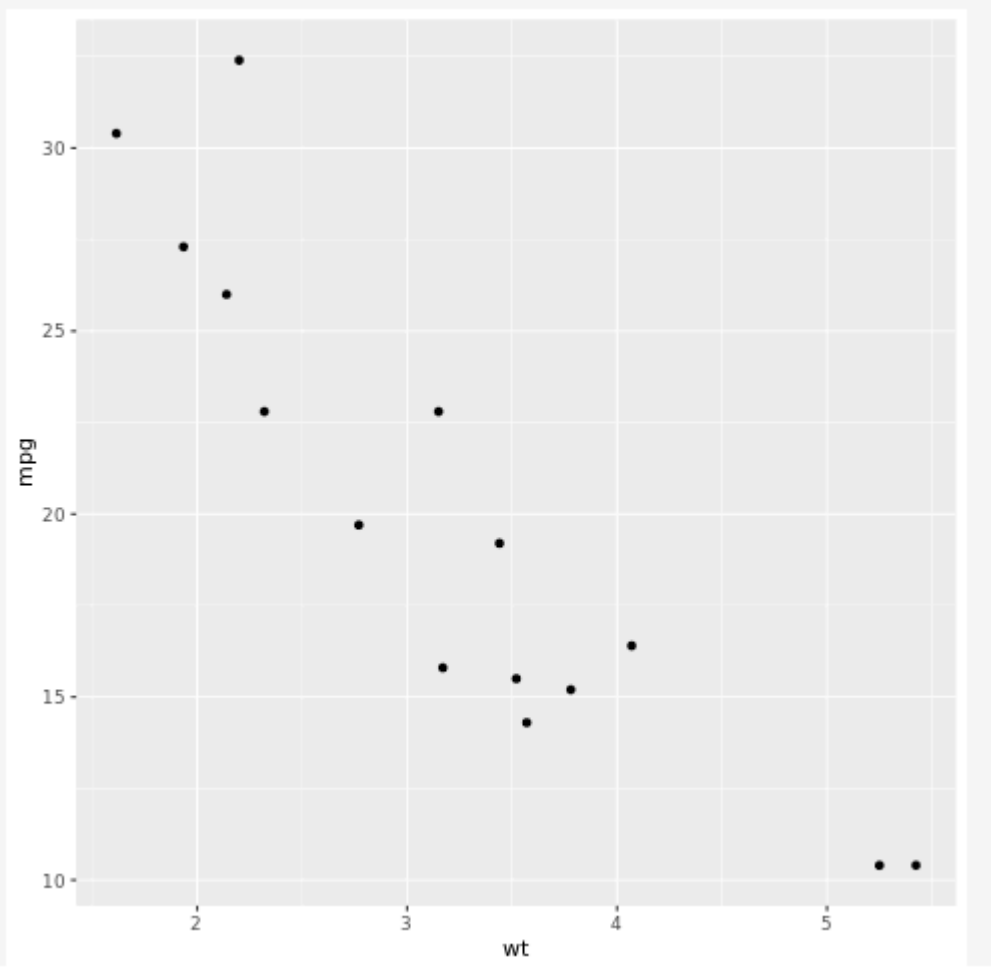
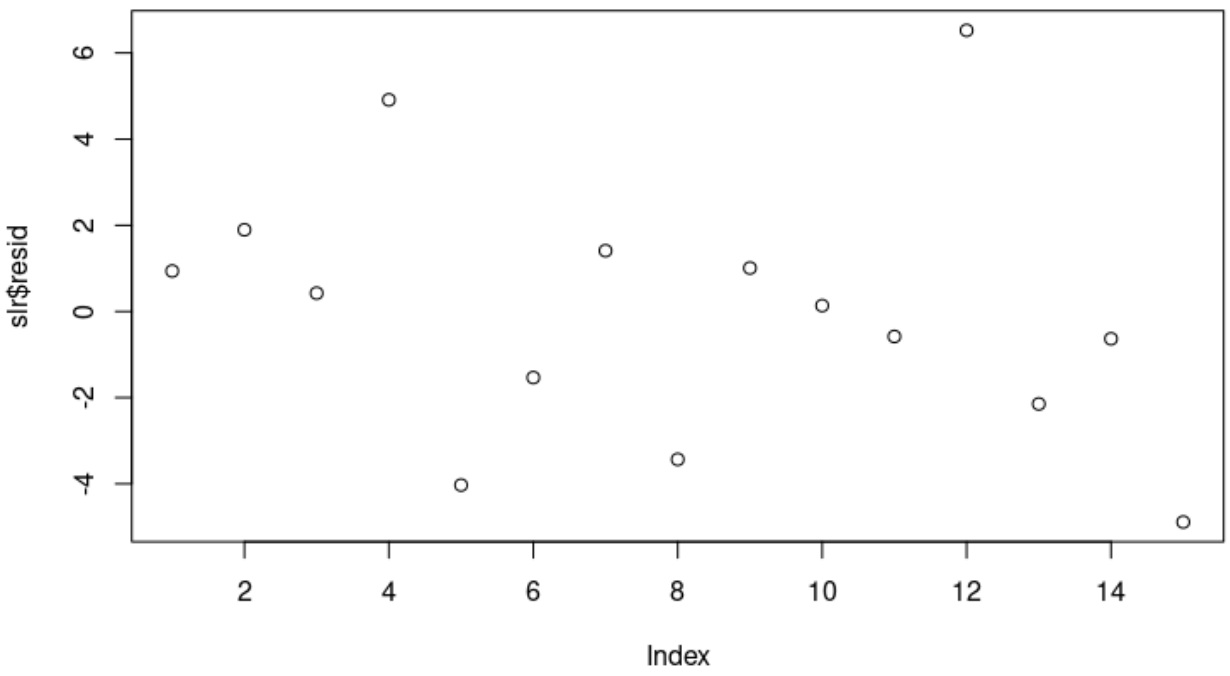
OUTPUT:

```
> data <- sample_n(data,15)
>
> # install packages ("ggplot2")
> library("ggplot2")
> ggplot(data, aes(x=wt,y=mpg))+geom_point()
> cor.test(data$wt,data$mpg)

        Pearson's product-moment correlation

data:  data$wt and data$mpg
t = -6.2959, df = 13, p-value = 2.762e-05
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.9553546 -0.6400169
sample estimates:
      cor
-0.867774

> slr = lm(mpg~wt, data)
> summary (slr)

Call:
lm(formula = mpg ~ wt, data = data)

Residuals:
    Min      1Q  Median      3Q     Max
-4.7251 -3.3019  0.2764  1.6628  6.3502

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  37.2055     2.9188  12.747 1.01e-08 ***
wt           -5.2620     0.8358  -6.296 2.76e-05 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.515 on 13 degrees of freedom
Multiple R-squared:  0.753,     Adjusted R-squared:  0.734
F-statistic: 39.64 on 1 and 13 DF,  p-value: 2.762e-05

> plot(slr$resid)
> qqnorm(slr$resid)
> mlr = lm(mpg~wt+gear,data)
> summary(mlr)
```

```
Call:
lm(formula = mpg ~ wt + gear, data = data)

Residuals:
   Min     1Q Median     3Q    Max
-4.669 -3.050  0.306  1.599  5.921

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  41.6091     8.4669   4.914 0.000357 ***
wt           -5.6601     1.1182  -5.062 0.000279 ***
gear         -0.8111     1.4583  -0.556 0.588312
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.612 on 12 degrees of freedom
Multiple R-squared:  0.7592,    Adjusted R-squared:  0.7191
F-statistic: 18.92 on 2 and 12 DF,  p-value: 0.0001948

> plot(mlr$resid)
> qqnorm(mlr$resid)
>
```





BCSE352E–Essentials of Data Analytics – Lab [Winter Semester 2023–24]

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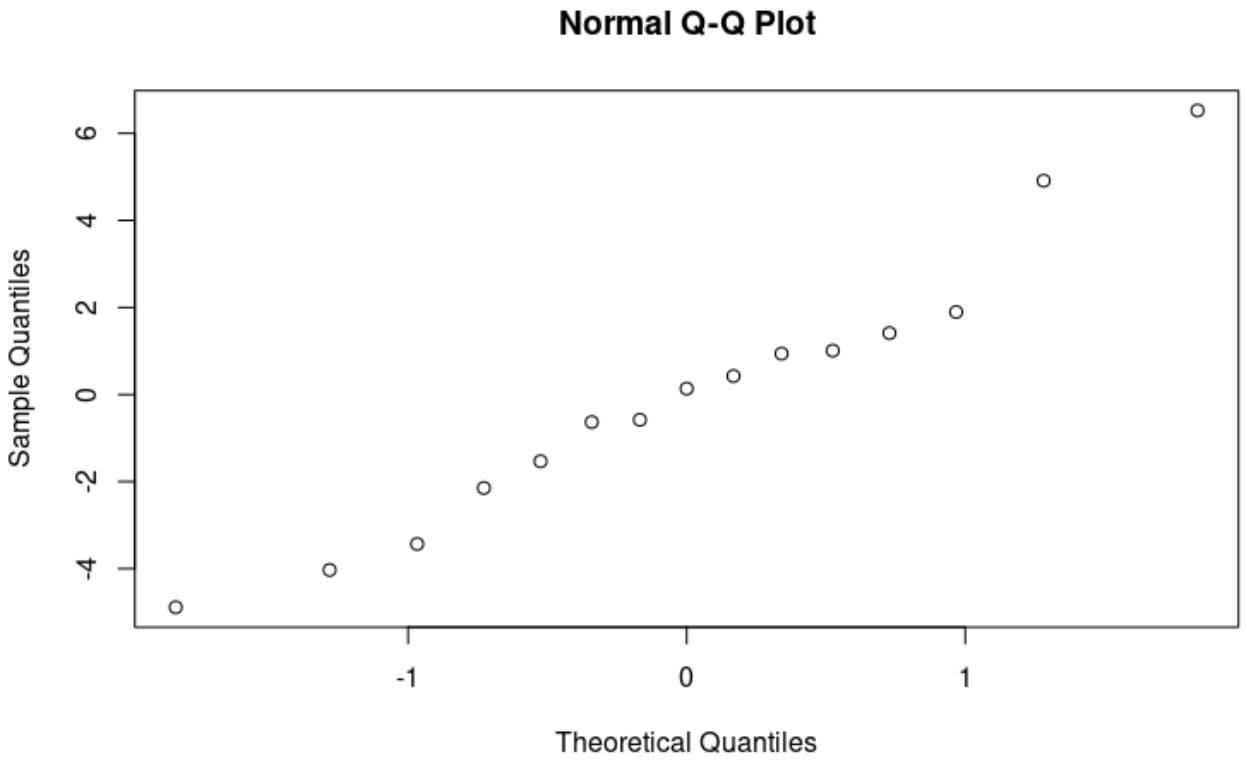

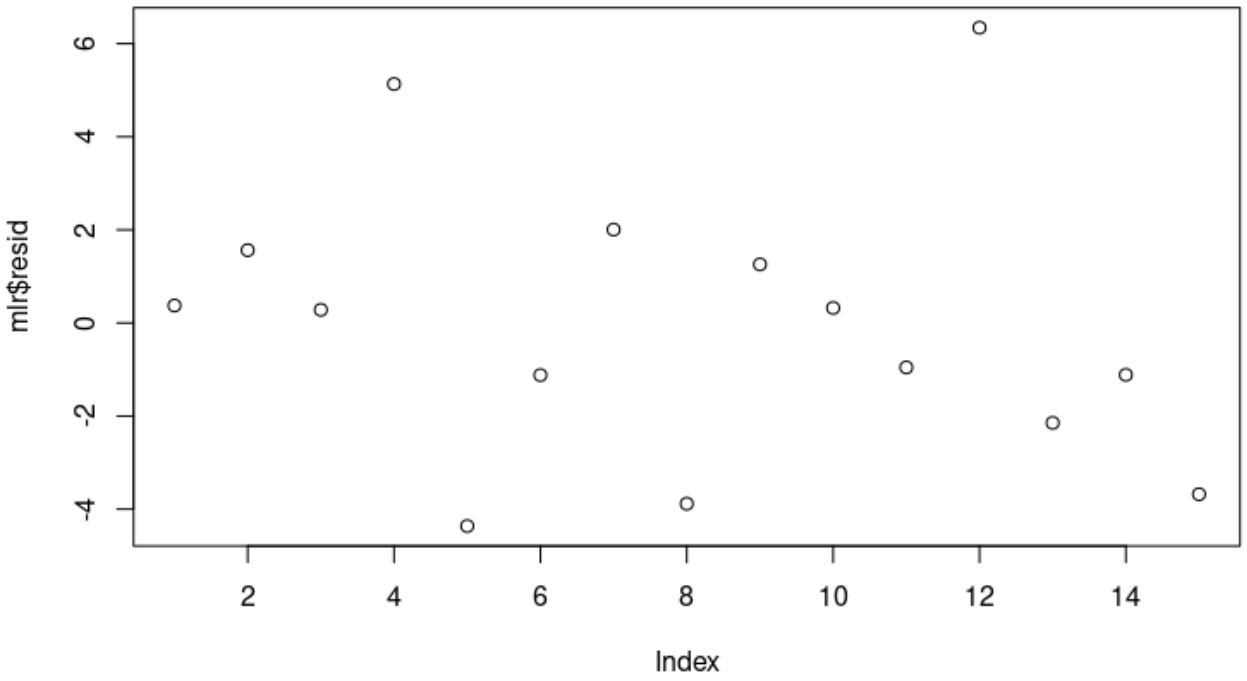

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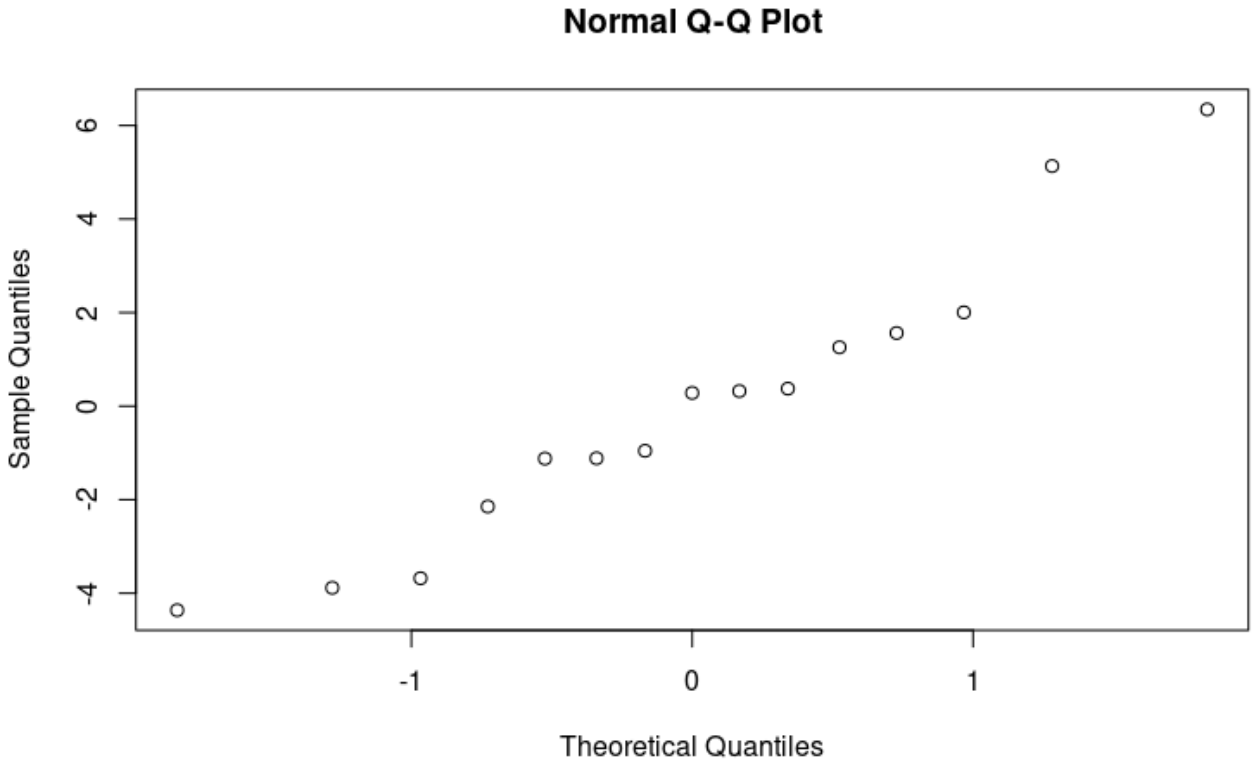

mlr	list [12] (S3: lm)	List of length 12
coefficients	double [3]	41.004 -5.380 -0.894
residuals	double [15]	0.373 1.563 0.281 5.132 -4.364 -1.123 ...
effects	double [15]	-74.59 23.06 -1.82 4.62 -4.64 -1.03 ...
rank	integer [1]	3
fitted.values	double [15]	21.03 17.64 27.02 9.57 17.66 18.92 ...
assign	integer [3]	0 1 2
qr	list [5] (S3: qr)	List of length 5
df.residual	integer [1]	12
xlevels	list [0]	List of length 0
call	language	lm(formula = mpg ~ wt + gear, data = data)
terms	formula	mpg ~ wt + gear
model	list [15 x 3] (S3: data.frame)	A data.frame with 15 rows and 3 columns

slr	list [12] (S3: lm)	List of length 12
coefficients	double [2]	36.57 -5.01
residuals	double [15]	0.938 1.895 0.424 4.912 -4.030 -1.534 ...
effects	double [15]	-74.594 23.064 0.728 4.064 -4.369 -1.738 ...
rank	integer [1]	2
fitted.values	double [15]	20.46 17.30 26.88 9.79 17.33 19.33 ...
assign	integer [2]	0 1
qr	list [5] (S3: qr)	List of length 5
df.residual	integer [1]	13
xlevels	list [0]	List of length 0
call	language	lm(formula = mpg ~ wt, data = data)
terms	formula	mpg ~ wt
model	list [15 x 2] (S3: data.frame)	A data.frame with 15 rows and 2 columns