

ESCUELA POLITÉCNICA NACIONAL
FACULTAD DE CIENCIAS
MODELOS LINEALES Y DISEÑO DE EXPERIMENTOS

Nombre: Ana Julia Escobar

Regresión sin el intercepto β_1

Informe:

```
install.packages("readxl", dependencies=TRUE)
library(readxl)
ls("package:readxl")
```

```
data <- read_excel("data_rls_uti.xlsx", sheet=1, na="")
str(data)
View(data)
```

```
reg <- lm(Utilidad~Ventas, data)
str(reg)
summary(reg)
anova <- aov(reg)
summary(anova)
qt(0.975,df=38)
qf(0.95,df=1,df2=38)
```

####datos centrados#####

```
> (a<- mean(data[, "Utilidad"]))
```

```
[1] 6683.725
```

```
> (b<- mean(data[, "Ventas"]))
```

```
[1] 14880.92
```

```
> (utilidad<- data[, "Utilidad"]-a)
```

```
[1] -666.725 1365.275 1867.275  36.275  707.275 1361.275 -869.725 -1729.725
[9] -1119.725  476.275  661.275 1649.275 -1442.725 -2077.725  60.275 -1409.725
[17] 1647.275 -1973.725 -1386.725 -243.725  649.275 1622.275  97.275  570.275
[25] -714.725 -1675.725 2295.275 -246.725  988.275 1462.275 -2019.725 1467.275
[33] -1477.725 2404.275 -1303.725 -2246.725 -2131.725 1409.275 -188.725 2128.275
```

```
> (ventas <- data[, "Ventas"]-b)
```

```
[1] -1610.925 2246.075 2933.075 1119.075 3145.075 2996.075 -1666.925 -4559.925
[9] -2515.925 354.075 420.075 4960.075 -2098.925 -4644.925 445.075 -3893.925
[17] 3631.075 -4860.925 -3844.925 452.075 3004.075 3577.075 531.075 231.075
[25] -1615.925 -4226.925 3825.075 446.075 3222.075 3221.075 -4280.925 2100.075
[33] -3312.925 4831.075 -3655.925 -4316.925 -3777.925 3103.075 223.075 3868.075
```

```
#Regresión con los datos centrados
> reg1 <- lm(utilidad1~ventas1)
> summary(reg1)
```

Call:

```
lm(formula = utilidad ~ ventas)
```

Residuals:

```
    Min     1Q  Median     3Q    Max
-676.35 -302.04  42.59  303.67  612.49
```

Coefficients:

```
Estimate Std. Error t value Pr(>|t|)
(Intercept) -6.835e-13 5.809e+01  0.00    1
ventas      4.399e-01 1.859e-02  23.66 <2e-16 ***
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 367.4 on 38 degrees of freedom

Multiple R-squared: 0.9364, Adjusted R-squared: 0.9348

F-statistic: 559.9 on 1 and 38 DF, p-value: < 2.2e-16

```
> anova1 <- aov(reg1)
> summary(anova1)
```

```
      Df Sum Sq Mean Sq F value Pr(>F)
ventas_c  1 75578286 75578286  559.9 <2e-16 ***
Residuals 38 5129142  134977
---
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 367.4 on 38 degrees of freedom

Multiple R-squared: 0.9364, Adjusted R-squared: 0.9348

F-statistic: 559.9 on 1 and 38 DF, p-value: < 2.2e-16

```
#intervalos de confianza
> confint(reg1, level=0.95)
```

```
      2.5 %    97.5 %
(Intercept) -117.5968432 117.5968432
ventas_c     0.4022981  0.4775722
```

```
> str(reg1[["residuals"]])
```

```
Named num [1:40] 42 377 577 -456 -676 ...  
- attr(*, "names")= chr [1:40] "1" "2" "3" "4" ...
```

```
> (predicciones1<-reg1[["fitted.values"]])
```

```
      1      2      3      4      5      6  
-708.70257 988.12739 1290.36285 492.32045 1383.62911 1318.07877  
      7      8      9     10     11     12  
-733.33894 -2006.07139 -1106.84390 155.77005 184.80577 2182.11145  
     13     14     15     16     17     18  
-923.39093 -2043.46588 195.80415 -1713.07457 1597.43761 -2138.49188  
     19     20     21     22     23     24  
-1691.51774 198.88369 1321.59825 1573.68111 233.63857 101.65802  
     25     26     27     28     29     30  
-710.90224 -1859.57298 1682.78503 196.24408 1417.50412 1417.06418  
     31     32     33     34     35     36  
-1883.32948 923.89686 -1457.47223 2125.35981 -1608.36999 -1899.16714  
     37     38     39     40  
-1662.04209 1365.15183 98.13854 1701.70224
```

```
> data4<-data.frame(utilidad1,ventas1,predicciones1,res1)
```

```
> View(data4)
```

```
> hist(res1,20)
```

```
> mean(res1)
```

```
[1] 7.494005e-17
```

```
> data5<-data.frame(res1)
```

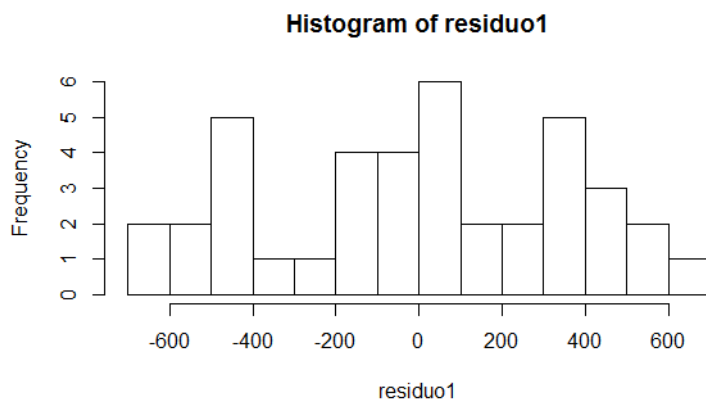
```
> View(data5)
```

```
> qqnorm(res1)
```

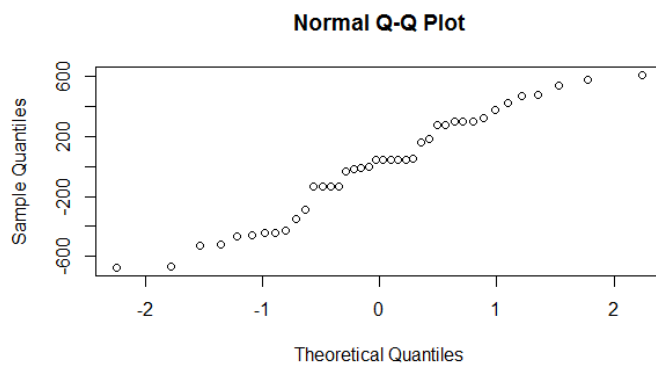
```
> qqline(res1,col="red")
```

```
> plot(res1,predicciones1)
```

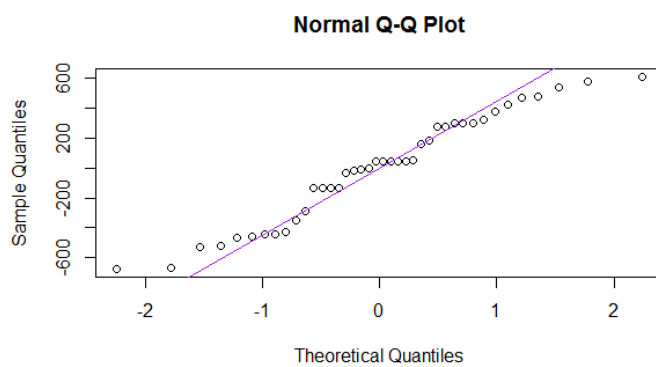
```
> plot(utilidad1,ventas1)
```



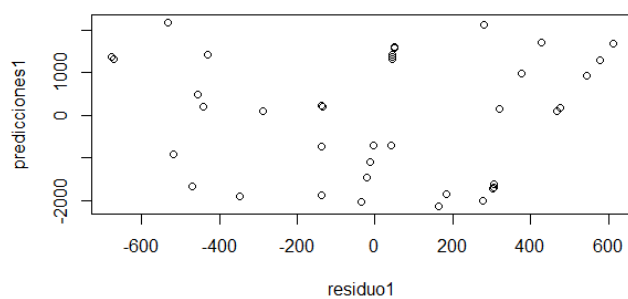
```
> qqnorm(residuo1) #grafico de la normalidad
```



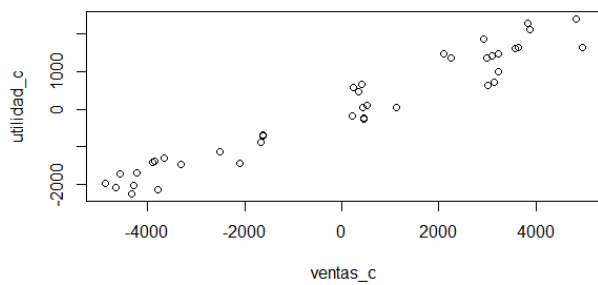
```
> qqline(residuo1,col="purple") #grafico de la normalidad con la recta
```



```
> plot(residuo1,predicciones1)
```



```
> plot(ventas_c,utilidad_c)
```



Análisis

$$\begin{aligned}\widehat{\beta}_1 &= -6.442e - 13 \approx 0 \\ \widehat{\beta}_2 &= 4.399e - 01\end{aligned}$$

Tenemos que: $Pr(> |t|) = 1 > 0.05$ por tanto la regresión es significativa.

Resumiendo los siguientes datos tenemos:

$$t \text{ tableado: } t_{n-2} \left(\frac{\alpha}{2} \right) = t_{38}(0.025) = qt(0.975, df = 38) = 2.024394$$

$$t \text{ value: } t \text{ value} = 0.00$$

Pero se cumple : $t \text{ tableado} = 2.024394 > t \text{ value} = 0$

Con lo que podemos concluir que se rechaza $H_0: \beta_2 = 0$ y comprobamos que la regresión es significativa.

Analizando la tabla anova, al decir que se rechaza $H_0: \beta_2 = 0$ dependiendo del valor de F.

Cuartil de Fisher de parámetros 1, n-2 y alfa:

$$F_{1,n-2}(\alpha) = F_{1,38}(0.05) = qf(0.95, df_1 = 1, df_2 = 38) = 4.098172$$

$$F \text{ value: } F = 559,9$$

$$\text{Como también se cumple: } F \text{ value} = 559,9 > F_{1,n-2}(\alpha) = 4,098172$$

Entonces se rechaza $H_0: \beta_2 = 0$.