Clase-4.R

Usuario

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```
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#09/08/2019
#Clase 4

# Correlación ------------------------------------------------------------

library(repmis)
```
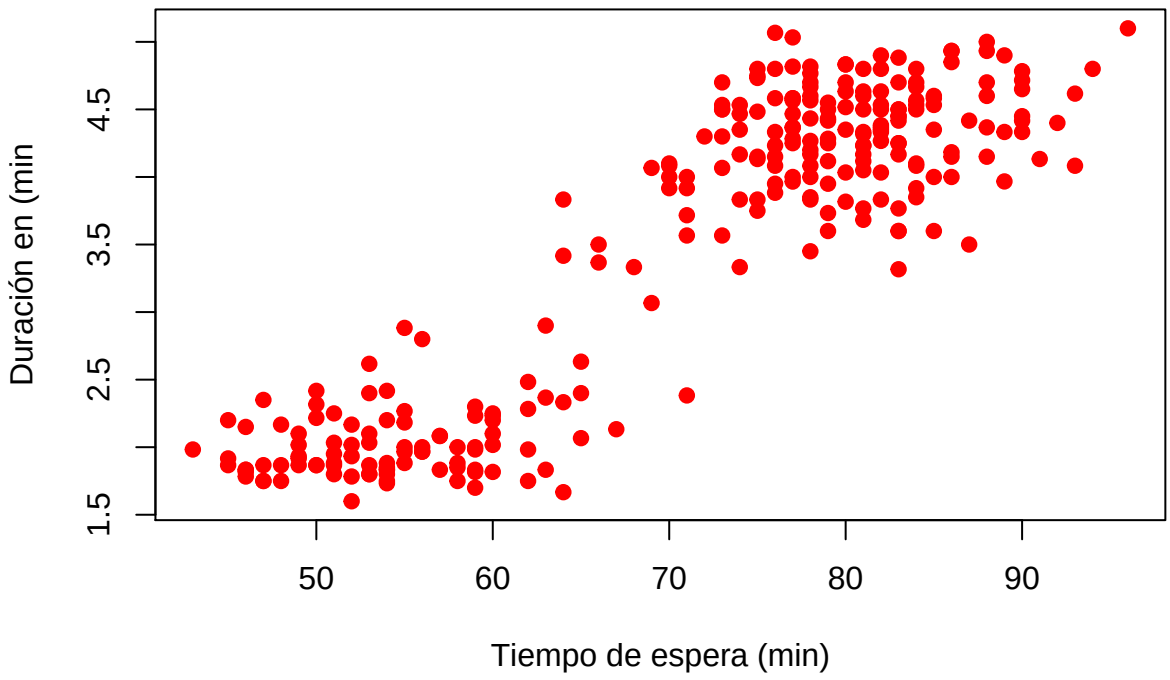

```
## Registered S3 method overwritten by 'R.oo':
##   method        from
##   throw.default R.methodsS3
```

```
erupciones <- source_data("https://dl.dropboxusercontent.com/s/liir6sil7hkqlxs/erupciones.csv")
```

```
## Downloading data from: https://dl.dropboxusercontent.com/s/liir6sil7hkqlxs/erupciones.csv
```

```
## SHA-1 hash of the downloaded data file is:
## b07708389ddf62ee20d19c759c88d7dc2d0da3ac
```

```
plot(erupciones$waiting, erupciones$eruptions, pch= 19, col= "red",
     xlab = "Tiempo de espera (min)",
     ylab = "Duración en (min")
```




```
library(pastecs)
stat.desc(erupciones$eruptions, basic = FALSE, norm = TRUE)
```

```
##        median          mean       SE.mean  CI.mean.0.95           var
##  4.000000e+00  3.487783e+00  6.920580e-02  1.362494e-01  1.302728e+00
##       std.dev      coef.var      skewness      skew.2SE      kurtosis
##  1.141371e+00  3.272483e-01 -4.135498e-01 -1.399854e+00 -1.511605e+00
##      kurt.2SE    normtest.W    normtest.p
## -2.567516e+00  8.459156e-01  9.036119e-16
```

```
shapiro.test(erupciones$eruptions)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  erupciones$eruptions
## W = 0.84592, p-value = 9.036e-16
```

```
#Segun la prueba de shipiro los datos no son de distribucion normal ya que se encuentran
#por debajo de el alfa establecido 0.05. Además de que involucran la variable tiempo la cual
#normalmente los datos no son normales.

shapiro.test(log(erupciones$eruptions))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  log(erupciones$eruptions)
```

```
## W = 0.81727, p-value < 2.2e-16
```

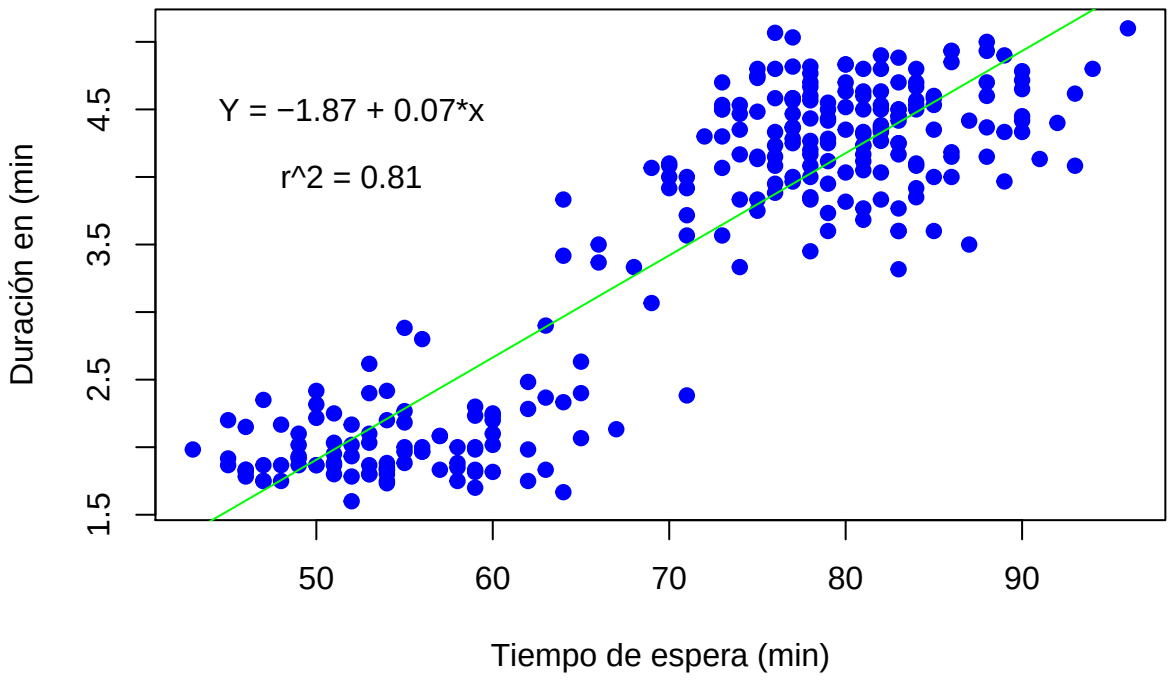
```
shapiro.test(erupciones$waiting)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  erupciones$waiting
## W = 0.92215, p-value = 1.015e-10
```

```
cor.test(erupciones$eruptions, erupciones$waiting)
```

```
##
##  Pearson's product-moment correlation
##
## data:  erupciones$eruptions and erupciones$waiting
## t = 34.089, df = 270, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.8756964 0.9210652
## sample estimates:
##       cor
## 0.9008112
```

```
#Si hay una correlacion
#La correlacion es significativa porque esta por debajo de 0.05 por lo cual se acepta H1


# Regresión Lineal  ----------------------------------------------------------

#Hipotesis general: Que el tiempo de espera nos ayudara a predecir la duracion de la
#proxima erupcion del geyser Old Faithfull.

#HO= no es significativa para la predicción.
#H1= si es significativa para predecir.

#Comando "ml" para realizar la regresión
lm.erup <- lm(erupciones$eruptions ~ erupciones$waiting)

#Grafica
plot(erupciones$waiting, erupciones$eruptions, pch= 19, col= "blue",
     xlab = "Tiempo de espera (min)",
     ylab = "Duración en (min")

abline(lm.erup, col= "green")

text(52, 4.5, "Y = -1.87 + 0.07*x")
text(52, 4, "r^2 = 0.81")
```




```
lm.erup
```

```
##
## Call:
## lm(formula = erupciones$eruptions ~ erupciones$waiting)
##
## Coefficients:
##        (Intercept)  erupciones$waiting
##           -1.87402             0.07563
```

```
summary(lm.erup)
```

```
##
## Call:
## lm(formula = erupciones$eruptions ~ erupciones$waiting)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.29917 -0.37689  0.03508  0.34909  1.19329
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)        -1.874016   0.160143  -11.70   <2e-16 ***
## erupciones$waiting  0.075628   0.002219   34.09   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 0.4965 on 270 degrees of freedom
## Multiple R-squared:  0.8115, Adjusted R-squared:  0.8108
## F-statistic:  1162 on 1 and 270 DF,  p-value: < 2.2e-16
```

```
length(erupciones$eruptions)
```

```
## [1] 272
```

```
sqrt(0.90)
```

```
## [1] 0.9486833
```

```
(0.90)^2
```

```
## [1] 0.81
```

```
#Para saber la duración en tiempo de espera de 60 min
y.60 <- -1.87 + 0.07*60
y.60
```

```
## [1] 2.33
```

```
# Datos de regresión ------------------------------------------------------

espera <-erupciones$waiting
duracion <- erupciones$eruptions

res <- resid(lm.erup)
res
```

```
##           1           2           3           4           5
## -0.500591902 -0.409893203 -0.389452162 -0.531916787 -0.021359589
##           6           7           8           9          10
##  0.597478849 -0.081243433 -0.954359589 -0.033009359 -0.204359589
##          11          12          13          14          15
## -0.376893203 -0.561731642  0.175036046  0.069502433  0.296896306
##          16          17          18          19          20
##  0.108362693 -1.064916787  0.321268358 -0.458637307  0.149408098
##          21          22          23          24          25
## -0.183009359  0.069502433 -0.574963954 -0.277312422  0.810547838
##          26          27          28          29          30
## -0.803103694 -0.318521151  0.209291942 -0.174963954  0.332408098
##          31          32          33          34          35
##  0.653175786  0.517663994  0.249571422 -0.143219850  0.110547838
##          36          37          38          39          40
## -0.041637307  0.110874485  0.656780150 -0.755032943 -0.149499329
##          41          42          43          44          45
##  0.173780150 -0.629404995  0.088268358 -0.762404995  0.886175786
##          46          47          48          49          50
## -1.086103694  0.866827317 -0.034265255  0.305524254 -0.588032943
##          51          52          53          54          55
##  1.001919890 -0.216499329 -0.376893203  0.656780150 -0.476893203
##          56          57          58          59          60
##  0.479896306  0.221431682 -1.299172683  0.617663994  0.065152202
##          61          62          63          64          65
## -0.355032943  0.021268358 -0.006125515  0.472524254 -0.846660891
##          66          67          68          69          70
## -0.683755225  0.142036046  0.675036046 -0.974800630  1.053175786
```

```
##          71          72          73          74          75
## -0.294475746 -0.394149099  0.399408098  0.504431682 -0.831916787
##          76          77          78          79          80
##  1.193291942 -0.646660891  0.542036046  0.009291942 -0.803103694
##          81          82          83          84          85
##  0.334919890  0.005524254  0.680059630 -0.408800630  0.420175786
##          86          87          88          89          90
##  0.151756567  0.076291942  0.340780150  0.410874485 -0.629987537
##          91          92          93          94          95
## -0.463660891 -0.599499329 -0.040381411  0.792036046 -1.057544735
##          96          97          98          99         100
##  0.728803734  0.188268358 -0.048080110 -0.116009359  0.572524254
##         101         102         103         104         105
## -0.331916787 -0.414243433  0.268246537  0.096896306 -0.201847798
##         106         107         108         109         110
##  0.186502433  0.221268358 -0.275637307  0.220012463 -0.568847798
##         111         112         113         114         115
##  0.934919890 -0.288032943  0.043128619  0.316408098 -0.888032943
##         116         117         118         119         120
##  0.381152202  0.409618589  0.045640411 -0.771032943 -0.288615485
##         121         122         123         124         125
##  0.482734745  0.722687578  0.300663994 -0.394149099 -0.181243433
##         126         127         128         129         130
## -0.484847798  0.387758329  0.172524254 -0.018521151 -0.282499329
##         131         132         133         134         135
##  0.337758329 -0.236103694  0.438850901 -0.523871381  0.228130381
##         136         137         138         139         140
##  0.055524254 -0.100009359  0.303012463 -0.101265255 -0.367591902
##         141         142         143         144         145
## -0.018847798 -0.430660891  0.205524254  0.867663994  0.459291942
##         146         147         148         149         150
## -0.605032943  0.456780150  0.185246537 -0.286267017 -0.334265255
##         151         152         153         154         155
##  1.083663994  0.050663994 -0.641800630  0.348152202  0.071431682
##         156         157         158         159         160
##  0.580059630  0.248152202 -1.076383173 -0.334265255 -0.889871381
##         161         162         163         164         165
##  0.670758329 -0.479987537 -0.512404995 -0.191963954  0.382571422
##         166         167         168         169         170
##  0.709291942 -0.523544735  0.218756567 -0.125637307 -0.542383173
##         171         172         173         174         175
##  0.085246537 -0.353777047  0.633663994  0.064315526 -0.084847798
##         176         177         178         179         180
##  0.081152202  0.853175786  0.509618589 -0.554359589  0.444547838
##         181         182         183         184         185
## -0.402521151  0.633663994 -0.153103694 -0.636103694  0.049990641
##         186         187         188         189         190
##  0.408036046 -0.395731642  0.228130381  0.013896306 -0.102521151
##         191         192         193         194         195
##  0.548152202 -0.603777047  0.926291942 -0.378731642  0.016663994
##         196         197         198         199         200
## -0.018847798 -1.205615485  0.416663994  0.266990641  0.642036046
##         201         202         203         204         205
## -0.563660891  0.022524254 -0.875127277 -0.267265255  0.575036046
```

```
##         206         207         208         209         210
##  0.178130381  0.417663994 -0.628731642  0.101246537  0.096896306
##         211         212         213         214         215
## -1.112568318  0.523780150  0.035246537  0.034919890  0.450827317
##         216         217         218         219         220
##  0.359291942  0.265734745 -0.435011121 -0.285521151  0.276291942
##         221         222         223         224         225
## -0.040381411 -0.060475746 -0.459893203  0.684919890 -0.024963954
##         226         227         228         229         230
##  0.016408098  0.058036046  0.242036046  0.497059630  0.449408098
##         231         232         233         234         235
##  0.663059630  0.207106797 -0.446987537  0.309618589 -0.482499329
##         236         237         238         239         240
## -0.326893203 -0.359893203  0.333663994 -0.150591902 -0.633172683
##         241         242         243         244         245
##  0.351919890  0.669502433  0.303012463  0.009455265  0.028640411
##         246         247         248         249         250
## -0.494475746 -0.353777047  0.039524254 -1.060056526  0.627547838
##         251         252         253         254         255
## -0.009893203  0.046896306 -0.079824214  0.853175786 -0.631243433
##         256         257         258         259         260
## -0.359219850  0.421431682  0.046896306 -0.361149099  0.182408098
##         261         262         263         264         265
##  0.742036046  0.054268358 -0.662404995 -0.153103694  0.605014224
##         266         267         268         269         270
## -0.413660891  0.951919890 -0.134847798  0.545130381 -0.515499329
##         271         272
##  0.212130381  0.744547838
```

```
sum(res)
```

```
## [1] 6.973588e-16
```

```
pre <- fitted(lm.erup)
res.2 <- res^2

cuadro <- round(data.frame(espera, duracion, pre, res,
                           res.2),4)
SSE <- sum(cuadro$res.2)
SSE
```

```
## [1] 66.5612
```

```
SSE <- sum((duracion - pre)^2)
SSE
```

```
## [1] 66.56178
```

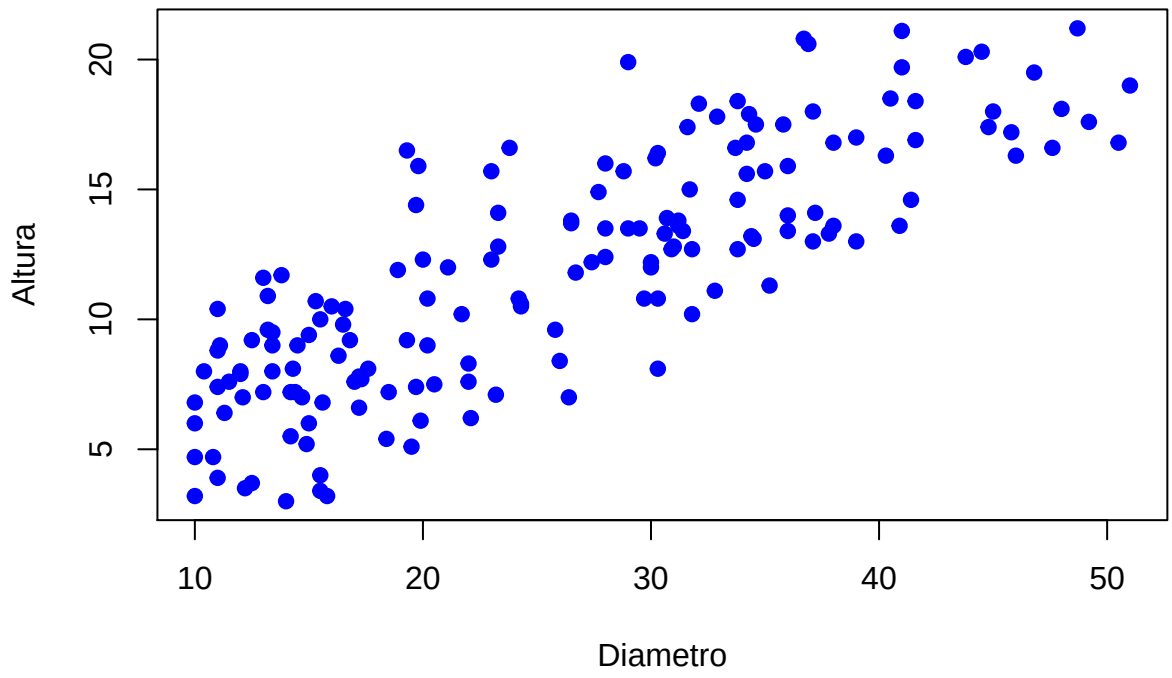
```
vari <- SSE/(length(erupciones$waiting)-2)
vari
```

```
## [1] 0.2465251
```

```
# Prueba de hipotesis de la regresión -------------------------------------

an.erup <- anova(lm.erup)
an.erup
```

```
## Analysis of Variance Table
##
## Response: erupciones$eruptions
##                     Df  Sum Sq Mean Sq F value    Pr(>F)
## erupciones$waiting   1 286.478 286.478  1162.1 < 2.2e-16 ***
## Residuals          270  66.562   0.247
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
#aceptamos la hiotesis alternativa que el modelo de regresion aplicado son
#significativos, entonces podemos decir que la regresión se puede aplicar.

# Ejercicio 2 ------------------------------------------------------------

#Importa datos de Ebanos (altura y diametro)
ebanos <- read.csv("C:/MCF202-2019/MCF202/Datos/ebanos.csv", header= T)

#Establecer la hipotesis
#hipotesis Nula (HO): No existen diferencias significativas entre las variables
#diametro y altura

#Hipotesis alternativa (H1): Si existen diferencias significativas entre las variables
#diametro y altura.
#Grafica

plot(ebanos$diametro, ebanos$altura, pch=19, col= "blue",
     xlab = "Diametro",
     ylab = "Altura")
```




```
#Se realizo la prueba de stat.desc solo con altura ya que es la variable dependiente.
library(pastecs)
stat.desc(ebanos$altura, basic = FALSE, norm= TRUE)
```

```
##       median         mean      SE.mean CI.mean.0.95          var
## 12.000000000 11.885365854  0.357428221  0.705786566 20.951809068
##      std.dev     coef.var     skewness     skew.2SE     kurtosis
##  4.577314613  0.385121894  0.053516314  0.141163547 -0.932366816
##     kurt.2SE   normtest.W   normtest.p
## -1.236840496  0.977187792  0.008242431
```

```
#Prueba de normalidad de datos
shapiro.test(log(ebanos$altura))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  log(ebanos$altura)
## W = 0.94218, p-value = 3.15e-06
```

```
shapiro.test(ebanos$altura)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  ebanos$altura
## W = 0.97719, p-value = 0.008242
```

```r
#Si existen diferencias significativas en la normalidad de los datos,
#y de distribucion anormal ya que el valor obtenido de p-value (0.008242) es menor a
#el alfa establecido de 0.05.

shapiro.test(ebanos$diametro)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  ebanos$diametro
## W = 0.94921, p-value = 1.215e-05
```

```r
#La distribucion es anormal, entonces si existen diferencias significativas
#segun la prueba de shapiro que nos da un valor de p-value de 1.215e-05.

cor.test(ebanos$diametro, ebanos$altura)
```

```
##
##  Pearson's product-moment correlation
##
## data:  ebanos$diametro and ebanos$altura
## t = 18.354, df = 162, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.7648115 0.8659458
## sample estimates:
##       cor
## 0.8217467
```

```r
#Deacuerdo a la prueba de correlacion aceptamos la hipotesis alternativa H1
#la cual nos indica que si hay diferencias significativas en los datos de diametro
#y altura ya que el p-value nos da un valor de 2.2e-16 que es menor al alfa de 0.05.
```