Clase4.R

Usuario

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```
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#Asignación 1
#09/08/2019
#Clase 4


# Correlacion ------------------------------------------------------------
erupcion <- read.csv("C:/MCF202-2019/Clase4/erupciones.csV", header = T)
summary(erupcion)
```

```
##    eruptions        waiting
##  Min.   :1.600   Min.   :43.0
##  1st Qu.:2.163   1st Qu.:58.0
##  Median :4.000   Median :76.0
##  Mean   :3.488   Mean   :70.9
##  3rd Qu.:4.454   3rd Qu.:82.0
##  Max.   :5.100   Max.   :96.0
```

```
plot(erupcion$waiting, erupcion$eruptions,xlab="Tiempo de espera (min)", ylab="Duracion (min)", pch=19,

# Determinar la estadistica de las variables ------------------------------
library(pastecs)
stat.desc (erupcion$eruptions)
```

```
##      nbr.val     nbr.null       nbr.na          min          max
##  272.0000000    0.0000000    0.0000000    1.6000000    5.1000000
##        range          sum       median         mean      SE.mean
##    3.5000000  948.6770000    4.0000000    3.4877831    0.0692058
## CI.mean.0.95          var      std.dev     coef.var
##    0.1362494    1.3027283    1.1413713    0.3272483
```

```
stat.desc(erupcion$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(erupcion$waiting)
```

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

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

```
##
##  Pearson's product-moment correlation
##
## data:  erupcion$eruptions and erupcion$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
```

```
# Conclusion ----------------------------------------------------------------
#correlacion significativa
#regresiva

# Regresion lineal ----------------------------------------------------------

#Hipotesis nula
# no sirve o significativa la predecir

#Hipotesis alternativa
#si es significatiba la predecir

#comando "lm" para relaizar la regresion
lm.erup <- lm(erupcion$eruptions ~ erupcion$waiting)
lm.erup
```

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

```
summary(erupcion$eruptions ~ erupcion$waiting)
```

```
##  Length   Class    Mode
##       3 formula    call
```

```
plot(erupcion$waiting, erupcion$eruptions,xlab="Tiempo de espera (min)", ylab="Duracion (min)", pch=19,
abline(lm.erup, col="red")

lm.erup
```

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

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

```
##
```

```
## Call:
## lm(formula = erupcion$eruptions ~ erupcion$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 ***
## erupcion$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(erupcion$eruptions)
```

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

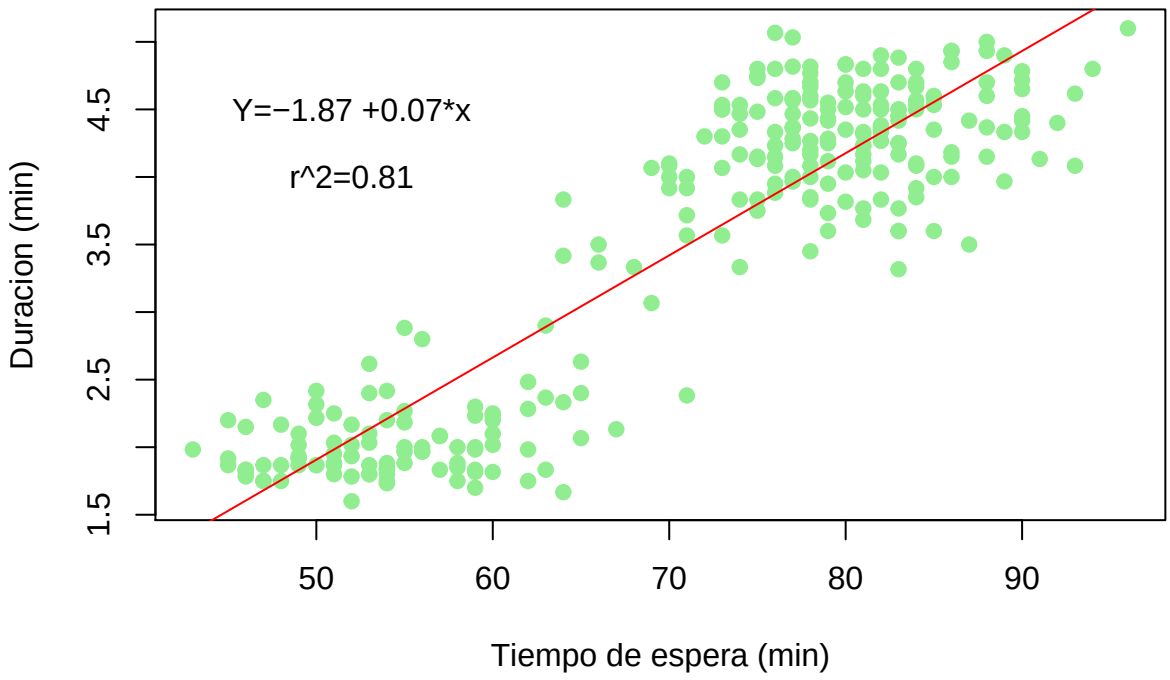
```
sqrt(0.90)
```

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

```
(0.90)^2
```

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

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




```
y.60<- -1.87 + 0.07*60
y.60
```

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

```
-1.87+0.07*30
```

```
## [1] 0.23
```

```
-1.87+0.07*115
```

```
## [1] 6.18
```

```
#varianza del experimento
espera <- erupcion$waiting
espera
```

```
##   [1] 79 54 74 62 85 55 88 85 51 85 54 84 78 47 83 52 62 84 52 79 51 47 78
##  [24] 69 74 83 55 76 78 79 73 77 66 80 74 52 48 80 59 90 80 58 84 58 73 83
##  [47] 64 53 82 59 75 90 54 80 54 83 71 64 77 81 59 84 48 82 60 92 78 78 65
##  [70] 73 82 56 79 71 62 76 60 78 76 83 75 82 70 65 73 88 76 80 48 86 60 90
##  [93] 50 78 63 72 84 75 51 82 62 88 49 83 81 47 84 52 86 81 75 59 89 79 59
## [116] 81 50 85 59 87 53 69 77 56 88 81 45 82 55 90 45 83 56 89 46 82 51 86
## [139] 53 79 81 60 82 77 76 59 80 49 96 53 77 77 65 81 71 70 81 93 53 89 45
## [162] 86 58 78 66 76 63 88 52 93 49 57 77 68 81 81 73 50 85 74 55 77 83 83
## [185] 51 78 84 46 83 55 81 57 76 84 77 81 87 77 51 78 60 82 91 53 78 46 77
## [208] 84 49 83 71 80 49 75 64 76 53 94 55 76 50 82 54 75 78 79 78 78 70 79
## [231] 70 54 86 50 90 54 54 77 79 64 75 47 86 63 85 82 57 82 67 74 54 83 73
## [254] 73 88 80 71 83 56 79 78 84 58 83 43 60 75 81 46 90 46 74
```

```
duracion <- erupcion$eruptions
duracion
```

```
##   [1] 3.600 1.800 3.333 2.283 4.533 2.883 4.700 3.600 1.950 4.350 1.833
##  [12] 3.917 4.200 1.750 4.700 2.167 1.750 4.800 1.600 4.250 1.800 1.750
##  [23] 3.450 3.067 4.533 3.600 1.967 4.083 3.850 4.433 4.300 4.467 3.367
##  [34] 4.033 3.833 2.017 1.867 4.833 1.833 4.783 4.350 1.883 4.567 1.750
##  [45] 4.533 3.317 3.833 2.100 4.633 2.000 4.800 4.716 1.833 4.833 1.733
##  [56] 4.883 3.717 1.667 4.567 4.317 2.233 4.500 1.750 4.800 1.817 4.400
##  [67] 4.167 4.700 2.067 4.700 4.033 1.967 4.500 4.000 1.983 5.067 2.017
##  [78] 4.567 3.883 3.600 4.133 4.333 4.100 2.633 4.067 4.933 3.950 4.517
##  [89] 2.167 4.000 2.200 4.333 1.867 4.817 1.833 4.300 4.667 3.750 1.867
## [100] 4.900 2.483 4.367 2.100 4.500 4.050 1.867 4.700 1.783 4.850 3.683
## [111] 4.733 2.300 4.900 4.417 1.700 4.633 2.317 4.600 1.817 4.417 2.617
## [122] 4.067 4.250 1.967 4.600 3.767 1.917 4.500 2.267 4.650 1.867 4.167
## [133] 2.800 4.333 1.833 4.383 1.883 4.933 2.033 3.733 4.233 2.233 4.533
## [144] 4.817 4.333 1.983 4.633 2.017 5.100 1.800 5.033 4.000 2.400 4.600
## [155] 3.567 4.000 4.500 4.083 1.800 3.967 2.200 4.150 2.000 3.833 3.500
## [166] 4.583 2.367 5.000 1.933 4.617 1.917 2.083 4.583 3.333 4.167 4.333
## [177] 4.500 2.417 4.000 4.167 1.883 4.583 4.250 3.767 2.033 4.433 4.083
## [188] 1.833 4.417 2.183 4.800 1.833 4.800 4.100 3.966 4.233 3.500 4.366
## [199] 2.250 4.667 2.100 4.350 4.133 1.867 4.600 1.783 4.367 3.850 1.933
## [210] 4.500 2.383 4.700 1.867 3.833 3.417 4.233 2.400 4.800 2.000 4.150
## [221] 1.867 4.267 1.750 4.483 4.000 4.117 4.083 4.267 3.917 4.550 4.083
## [232] 2.417 4.183 2.217 4.450 1.883 1.850 4.283 3.950 2.333 4.150 2.350
## [243] 4.933 2.900 4.583 3.833 2.083 4.367 2.133 4.350 2.200 4.450 3.567
## [254] 4.500 4.150 3.817 3.917 4.450 2.000 4.283 4.767 4.533 1.850 4.250
## [265] 1.983 2.250 4.750 4.117 2.150 4.417 1.817 4.467
```

```
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)
pre
```

```
##        1        2        3        4        5        6        7        8
## 4.100592 2.209893 3.722452 2.814917 4.554360 2.285521 4.781243 4.554360
##        9       10       11       12       13       14       15       16
## 1.983009 4.554360 2.209893 4.478732 4.024964 1.680498 4.403104 2.058637
##       17       18       19       20       21       22       23       24
## 2.814917 4.478732 2.058637 4.100592 1.983009 1.680498 4.024964 3.344312
##       25       26       27       28       29       30       31       32
## 3.722452 4.403104 2.285521 3.873708 4.024964 4.100592 3.646824 3.949336
##       33       34       35       36       37       38       39       40
## 3.117429 4.176220 3.722452 2.058637 1.756126 4.176220 2.588033 4.932499
##       41       42       43       44       45       46       47       48
## 4.176220 2.512405 4.478732 2.512405 3.646824 4.403104 2.966173 2.134265
##       49       50       51       52       53       54       55       56
## 4.327476 2.588033 3.798080 4.932499 2.209893 4.176220 2.209893 4.403104
```

```
##       57       58       59       60       61       62       63       64
## 3.495568 2.966173 3.949336 4.251848 2.588033 4.478732 1.756126 4.327476
##       65       66       67       68       69       70       71       72
## 2.663661 5.083755 4.024964 4.024964 3.041801 3.646824 4.327476 2.361149
##       73       74       75       76       77       78       79       80
## 4.100592 3.495568 2.814917 3.873708 2.663661 4.024964 3.873708 4.403104
##       81       82       83       84       85       86       87       88
## 3.798080 4.327476 3.419940 3.041801 3.646824 4.781243 3.873708 4.176220
##       89       90       91       92       93       94       95       96
## 1.756126 4.629988 2.663661 4.932499 1.907381 4.024964 2.890545 3.571196
##       97       98       99      100      101      102      103      104
## 4.478732 3.798080 1.983009 4.327476 2.814917 4.781243 1.831753 4.403104
##      105      106      107      108      109      110      111      112
## 4.251848 1.680498 4.478732 2.058637 4.629988 4.251848 3.798080 2.588033
##      113      114      115      116      117      118      119      120
## 4.856871 4.100592 2.588033 4.251848 1.907381 4.554360 2.588033 4.705615
##      121      122      123      124      125      126      127      128
## 2.134265 3.344312 3.949336 2.361149 4.781243 4.251848 1.529242 4.327476
##      129      130      131      132      133      134      135      136
## 2.285521 4.932499 1.529242 4.403104 2.361149 4.856871 1.604870 4.327476
##      137      138      139      140      141      142      143      144
## 1.983009 4.629988 2.134265 4.100592 4.251848 2.663661 4.327476 3.949336
##      145      146      147      148      149      150      151      152
## 3.873708 2.588033 4.176220 1.831753 5.386267 2.134265 3.949336 3.949336
##      153      154      155      156      157      158      159      160
## 3.041801 4.251848 3.495568 3.419940 4.251848 5.159383 2.134265 4.856871
##      161      162      163      164      165      166      167      168
## 1.529242 4.629988 2.512405 4.024964 3.117429 3.873708 2.890545 4.781243
##      169      170      171      172      173      174      175      176
## 2.058637 5.159383 1.831753 2.436777 3.949336 3.268684 4.251848 4.251848
##      177      178      179      180      181      182      183      184
## 3.646824 1.907381 4.554360 3.722452 2.285521 3.949336 4.403104 4.403104
##      185      186      187      188      189      190      191      192
## 1.983009 4.024964 4.478732 1.604870 4.403104 2.285521 4.251848 2.436777
##      193      194      195      196      197      198      199      200
## 3.873708 4.478732 3.949336 4.251848 4.705615 3.949336 1.983009 4.024964
##      201      202      203      204      205      206      207      208
## 2.663661 4.327476 5.008127 2.134265 4.024964 1.604870 3.949336 4.478732
##      209      210      211      212      213      214      215      216
## 1.831753 4.403104 3.495568 4.176220 1.831753 3.798080 2.966173 3.873708
##      217      218      219      220      221      222      223      224
## 2.134265 5.235011 2.285521 3.873708 1.907381 4.327476 2.209893 3.798080
##      225      226      227      228      229      230      231      232
## 4.024964 4.100592 4.024964 4.024964 3.419940 4.100592 3.419940 2.209893
##      233      234      235      236      237      238      239      240
## 4.629988 1.907381 4.932499 2.209893 2.209893 3.949336 4.100592 2.966173
##      241      242      243      244      245      246      247      248
## 3.798080 1.680498 4.629988 2.890545 4.554360 4.327476 2.436777 4.327476
##      249      250      251      252      253      254      255      256
## 3.193057 3.722452 2.209893 4.403104 3.646824 3.646824 4.781243 4.176220
##      257      258      259      260      261      262      263      264
## 3.495568 4.403104 2.361149 4.100592 4.024964 4.478732 2.512405 4.403104
##      265      266      267      268      269      270      271      272
## 1.377986 2.663661 3.798080 4.251848 1.604870 4.932499 1.604870 3.722452
```

```r
res.2 <- res^2
res.2
```

```
##            1            2            3            4            5
## 2.505923e-01 1.680124e-01 1.516730e-01 2.829355e-01 4.562321e-04
##            6            7            8            9           10
## 3.569810e-01 6.600495e-03 9.108022e-01 1.089618e-03 4.176284e-02
##           11           12           13           14           15
## 1.420485e-01 3.155424e-01 3.063762e-02 4.830588e-03 8.814742e-02
##           16           17           18           19           20
## 1.174247e-02 1.134048e+00 1.032134e-01 2.103482e-01 2.232278e-02
##           21           22           23           24           25
## 3.349243e-02 4.830588e-03 3.305835e-01 7.690218e-02 6.569878e-01
##           26           27           28           29           30
## 6.449755e-01 1.014557e-01 4.380312e-02 3.061239e-02 1.104951e-01
##           31           32           33           34           35
## 4.266386e-01 2.679760e-01 6.228589e-02 2.051193e-02 1.222082e-02
##           36           37           38           39           40
## 1.733665e-03 1.229315e-02 4.313602e-01 5.700747e-01 2.235005e-02
##           41           42           43           44           45
## 3.019954e-02 3.961506e-01 7.791303e-03 5.812614e-01 7.853075e-01
##           46           47           48           49           50
## 1.179621e+00 7.513896e-01 1.174108e-03 9.334507e-02 3.457827e-01
##           51           52           53           54           55
## 1.003843e+00 4.687196e-02 1.420485e-01 4.313602e-01 2.274271e-01
##           56           57           58           59           60
## 2.303005e-01 4.903199e-02 1.687850e+00 3.815088e-01 4.244809e-03
##           61           62           63           64           65
## 1.260484e-01 4.523431e-04 3.752194e-05 2.232792e-01 7.168347e-01
##           66           67           68           69           70
## 4.675212e-01 2.017424e-02 4.556737e-01 9.502363e-01 1.109179e+00
##           71           72           73           74           75
## 8.671596e-02 1.553535e-01 1.595268e-01 2.544513e-01 6.920855e-01
##           76           77           78           79           80
## 1.423946e+00 4.181703e-01 2.938031e-01 8.634019e-05 6.449755e-01
##           81           82           83           84           85
## 1.121713e-01 3.051739e-05 4.624811e-01 1.671180e-01 1.765477e-01
##           86           87           88           89           90
## 2.303006e-02 5.820460e-03 1.161311e-01 1.688178e-01 3.968843e-01
##           91           92           93           94           95
## 2.149814e-01 3.593994e-01 1.630658e-03 6.273211e-01 1.118401e+00
##           96           97           98           99          100
## 5.311549e-01 3.544497e-02 2.311697e-03 1.345817e-02 3.277840e-01
##          101          102          103          104          105
## 1.101688e-01 1.715976e-01 7.195620e-02 9.388894e-03 4.074253e-02
##          106          107          108          109          110
## 3.478316e-02 4.895969e-02 7.597593e-02 4.840548e-02 3.235878e-01
##          111          112          113          114          115
## 8.740752e-01 8.296298e-02 1.860078e-03 1.001141e-01 7.886025e-01
##          116          117          118          119          120
## 1.452770e-01 1.677874e-01 2.083047e-03 5.944918e-01 8.329890e-02
##          121          122          123          124          125
## 2.330328e-01 5.222773e-01 9.039884e-02 1.553535e-01 3.284918e-02
##          126          127          128          129          130
```

```
## 2.350774e-01 1.503565e-01 2.976462e-02 3.430330e-04 7.980587e-02
##          131          132          133          134          135
## 1.140807e-01 5.574495e-02 1.925901e-01 2.744412e-01 5.204347e-02
##          136          137          138          139          140
## 3.082943e-03 1.000187e-02 9.181655e-02 1.025465e-02 1.351238e-01
##          141          142          143          144          145
## 3.552395e-04 1.854688e-01 4.224022e-02 7.528408e-01 2.109491e-01
##          146          147          148          149          150
## 3.660649e-01 2.086481e-01 3.431628e-02 8.194881e-02 1.117333e-01
##          151          152          153          154          155
## 1.174328e+00 2.566840e-03 4.119080e-01 1.212100e-01 5.102485e-03
##          156          157          158          159          160
## 3.364692e-01 6.157952e-02 1.158601e+00 1.117333e-01 7.918711e-01
##          161          162          163          164          165
## 4.499167e-01 2.303880e-01 2.625589e-01 3.685016e-02 1.463609e-01
##          166          167          168          169          170
## 5.030951e-01 2.740991e-01 4.785444e-02 1.578473e-02 2.941795e-01
##          171          172          173          174          175
## 7.266972e-03 1.251582e-01 4.015301e-01 4.136487e-03 7.199149e-03
##          176          177          178          179          180
## 6.585680e-03 7.279089e-01 2.597111e-01 3.073146e-01 1.976228e-01
##          181          182          183          184          185
## 1.620233e-01 4.015301e-01 2.344074e-02 4.046279e-01 2.499064e-03
##          186          187          188          189          190
## 1.664934e-01 1.566035e-01 5.204347e-02 1.931073e-04 1.051059e-02
##          191          192          193          194          195
## 3.004708e-01 3.645467e-01 8.580168e-01 1.434377e-01 2.776887e-04
##          196          197          198          199          200
## 3.552395e-04 1.453509e+00 1.736089e-01 7.128400e-02 4.122103e-01
##          201          202          203          204          205
## 3.177136e-01 5.073420e-04 7.658478e-01 7.143072e-02 3.306665e-01
##          206          207          208          209          210
## 3.173043e-02 1.744432e-01 3.953035e-01 1.025086e-02 9.388894e-03
##          211          212          213          214          215
## 1.237808e+00 2.743456e-01 1.242318e-03 1.219399e-03 2.032453e-01
##          216          217          218          219          220
## 1.290907e-01 7.061495e-02 1.892347e-01 8.152233e-02 7.633724e-02
##          221          222          223          224          225
## 1.630658e-03 3.657316e-03 2.115018e-01 4.691153e-01 6.231990e-04
##          226          227          228          229          230
## 2.692257e-04 3.368183e-03 5.858145e-02 2.470683e-01 2.019676e-01
##          231          232          233          234          235
## 4.396481e-01 4.289323e-02 1.997979e-01 9.586367e-02 2.328056e-01
##          236          237          238          239          240
## 1.068592e-01 1.295231e-01 1.113317e-01 2.267792e-02 4.009076e-01
##          241          242          243          244          245
## 1.238476e-01 4.482335e-01 9.181655e-02 8.940204e-05 8.202731e-04
##          246          247          248          249          250
## 2.445063e-01 1.251582e-01 1.562167e-03 1.123720e+00 3.938163e-01
##          251          252          253          254          255
## 9.787547e-05 2.199264e-03 6.371905e-03 7.279089e-01 3.984683e-01
##          256          257          258          259          260
## 1.290389e-01 1.776047e-01 2.199264e-03 1.304287e-01 3.327271e-02
##          261          262          263          264          265
```

```
## 5.506175e-01 2.945055e-03 4.387804e-01 2.344074e-02 3.660422e-01
##          266          267          268          269          270
## 1.711153e-01 9.061515e-01 1.818393e-02 2.971671e-01 2.657396e-01
##          271          272
## 4.499930e-02 5.543515e-01
```

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

```
##     espera duracion    pre     res  res.2
## 1       79    3.600 4.1006 -0.5006 0.2506
## 2       54    1.800 2.2099 -0.4099 0.1680
## 3       74    3.333 3.7225 -0.3895 0.1517
## 4       62    2.283 2.8149 -0.5319 0.2829
## 5       85    4.533 4.5544 -0.0214 0.0005
## 6       55    2.883 2.2855  0.5975 0.3570
## 7       88    4.700 4.7812 -0.0812 0.0066
## 8       85    3.600 4.5544 -0.9544 0.9108
## 9       51    1.950 1.9830 -0.0330 0.0011
## 10      85    4.350 4.5544 -0.2044 0.0418
## 11      54    1.833 2.2099 -0.3769 0.1420
## 12      84    3.917 4.4787 -0.5617 0.3155
## 13      78    4.200 4.0250  0.1750 0.0306
## 14      47    1.750 1.6805  0.0695 0.0048
## 15      83    4.700 4.4031  0.2969 0.0881
## 16      52    2.167 2.0586  0.1084 0.0117
## 17      62    1.750 2.8149 -1.0649 1.1340
## 18      84    4.800 4.4787  0.3213 0.1032
## 19      52    1.600 2.0586 -0.4586 0.2103
## 20      79    4.250 4.1006  0.1494 0.0223
## 21      51    1.800 1.9830 -0.1830 0.0335
## 22      47    1.750 1.6805  0.0695 0.0048
## 23      78    3.450 4.0250 -0.5750 0.3306
## 24      69    3.067 3.3443 -0.2773 0.0769
## 25      74    4.533 3.7225  0.8105 0.6570
## 26      83    3.600 4.4031 -0.8031 0.6450
## 27      55    1.967 2.2855 -0.3185 0.1015
## 28      76    4.083 3.8737  0.2093 0.0438
## 29      78    3.850 4.0250 -0.1750 0.0306
## 30      79    4.433 4.1006  0.3324 0.1105
## 31      73    4.300 3.6468  0.6532 0.4266
## 32      77    4.467 3.9493  0.5177 0.2680
## 33      66    3.367 3.1174  0.2496 0.0623
## 34      80    4.033 4.1762 -0.1432 0.0205
## 35      74    3.833 3.7225  0.1105 0.0122
## 36      52    2.017 2.0586 -0.0416 0.0017
## 37      48    1.867 1.7561  0.1109 0.0123
## 38      80    4.833 4.1762  0.6568 0.4314
## 39      59    1.833 2.5880 -0.7550 0.5701
## 40      90    4.783 4.9325 -0.1495 0.0224
## 41      80    4.350 4.1762  0.1738 0.0302
## 42      58    1.883 2.5124 -0.6294 0.3962
## 43      84    4.567 4.4787  0.0883 0.0078
## 44      58    1.750 2.5124 -0.7624 0.5813
## 45      73    4.533 3.6468  0.8862 0.7853
```

```
## 46      83    3.317 4.4031 -1.0861 1.1796
## 47      64    3.833 2.9662  0.8668 0.7514
## 48      53    2.100 2.1343 -0.0343 0.0012
## 49      82    4.633 4.3275  0.3055 0.0933
## 50      59    2.000 2.5880 -0.5880 0.3458
## 51      75    4.800 3.7981  1.0019 1.0038
## 52      90    4.716 4.9325 -0.2165 0.0469
## 53      54    1.833 2.2099 -0.3769 0.1420
## 54      80    4.833 4.1762  0.6568 0.4314
## 55      54    1.733 2.2099 -0.4769 0.2274
## 56      83    4.883 4.4031  0.4799 0.2303
## 57      71    3.717 3.4956  0.2214 0.0490
## 58      64    1.667 2.9662 -1.2992 1.6878
## 59      77    4.567 3.9493  0.6177 0.3815
## 60      81    4.317 4.2518  0.0652 0.0042
## 61      59    2.233 2.5880 -0.3550 0.1260
## 62      84    4.500 4.4787  0.0213 0.0005
## 63      48    1.750 1.7561 -0.0061 0.0000
## 64      82    4.800 4.3275  0.4725 0.2233
## 65      60    1.817 2.6637 -0.8467 0.7168
## 66      92    4.400 5.0838 -0.6838 0.4675
## 67      78    4.167 4.0250  0.1420 0.0202
## 68      78    4.700 4.0250  0.6750 0.4557
## 69      65    2.067 3.0418 -0.9748 0.9502
## 70      73    4.700 3.6468  1.0532 1.1092
## 71      82    4.033 4.3275 -0.2945 0.0867
## 72      56    1.967 2.3611 -0.3941 0.1554
## 73      79    4.500 4.1006  0.3994 0.1595
## 74      71    4.000 3.4956  0.5044 0.2545
## 75      62    1.983 2.8149 -0.8319 0.6921
## 76      76    5.067 3.8737  1.1933 1.4239
## 77      60    2.017 2.6637 -0.6467 0.4182
## 78      78    4.567 4.0250  0.5420 0.2938
## 79      76    3.883 3.8737  0.0093 0.0001
## 80      83    3.600 4.4031 -0.8031 0.6450
## 81      75    4.133 3.7981  0.3349 0.1122
## 82      82    4.333 4.3275  0.0055 0.0000
## 83      70    4.100 3.4199  0.6801 0.4625
## 84      65    2.633 3.0418 -0.4088 0.1671
## 85      73    4.067 3.6468  0.4202 0.1765
## 86      88    4.933 4.7812  0.1518 0.0230
## 87      76    3.950 3.8737  0.0763 0.0058
## 88      80    4.517 4.1762  0.3408 0.1161
## 89      48    2.167 1.7561  0.4109 0.1688
## 90      86    4.000 4.6300 -0.6300 0.3969
## 91      60    2.200 2.6637 -0.4637 0.2150
## 92      90    4.333 4.9325 -0.5995 0.3594
## 93      50    1.867 1.9074 -0.0404 0.0016
## 94      78    4.817 4.0250  0.7920 0.6273
## 95      63    1.833 2.8905 -1.0575 1.1184
## 96      72    4.300 3.5712  0.7288 0.5312
## 97      84    4.667 4.4787  0.1883 0.0354
## 98      75    3.750 3.7981 -0.0481 0.0023
## 99      51    1.867 1.9830 -0.1160 0.0135
```

```
## 100     82    4.900 4.3275  0.5725 0.3278
## 101     62    2.483 2.8149 -0.3319 0.1102
## 102     88    4.367 4.7812 -0.4142 0.1716
## 103     49    2.100 1.8318  0.2682 0.0720
## 104     83    4.500 4.4031  0.0969 0.0094
## 105     81    4.050 4.2518 -0.2018 0.0407
## 106     47    1.867 1.6805  0.1865 0.0348
## 107     84    4.700 4.4787  0.2213 0.0490
## 108     52    1.783 2.0586 -0.2756 0.0760
## 109     86    4.850 4.6300  0.2200 0.0484
## 110     81    3.683 4.2518 -0.5688 0.3236
## 111     75    4.733 3.7981  0.9349 0.8741
## 112     59    2.300 2.5880 -0.2880 0.0830
## 113     89    4.900 4.8569  0.0431 0.0019
## 114     79    4.417 4.1006  0.3164 0.1001
## 115     59    1.700 2.5880 -0.8880 0.7886
## 116     81    4.633 4.2518  0.3812 0.1453
## 117     50    2.317 1.9074  0.4096 0.1678
## 118     85    4.600 4.5544  0.0456 0.0021
## 119     59    1.817 2.5880 -0.7710 0.5945
## 120     87    4.417 4.7056 -0.2886 0.0833
## 121     53    2.617 2.1343  0.4827 0.2330
## 122     69    4.067 3.3443  0.7227 0.5223
## 123     77    4.250 3.9493  0.3007 0.0904
## 124     56    1.967 2.3611 -0.3941 0.1554
## 125     88    4.600 4.7812 -0.1812 0.0328
## 126     81    3.767 4.2518 -0.4848 0.2351
## 127     45    1.917 1.5292  0.3878 0.1504
## 128     82    4.500 4.3275  0.1725 0.0298
## 129     55    2.267 2.2855 -0.0185 0.0003
## 130     90    4.650 4.9325 -0.2825 0.0798
## 131     45    1.867 1.5292  0.3378 0.1141
## 132     83    4.167 4.4031 -0.2361 0.0557
## 133     56    2.800 2.3611  0.4389 0.1926
## 134     89    4.333 4.8569 -0.5239 0.2744
## 135     46    1.833 1.6049  0.2281 0.0520
## 136     82    4.383 4.3275  0.0555 0.0031
## 137     51    1.883 1.9830 -0.1000 0.0100
## 138     86    4.933 4.6300  0.3030 0.0918
## 139     53    2.033 2.1343 -0.1013 0.0103
## 140     79    3.733 4.1006 -0.3676 0.1351
## 141     81    4.233 4.2518 -0.0188 0.0004
## 142     60    2.233 2.6637 -0.4307 0.1855
## 143     82    4.533 4.3275  0.2055 0.0422
## 144     77    4.817 3.9493  0.8677 0.7528
## 145     76    4.333 3.8737  0.4593 0.2109
## 146     59    1.983 2.5880 -0.6050 0.3661
## 147     80    4.633 4.1762  0.4568 0.2086
## 148     49    2.017 1.8318  0.1852 0.0343
## 149     96    5.100 5.3863 -0.2863 0.0819
## 150     53    1.800 2.1343 -0.3343 0.1117
## 151     77    5.033 3.9493  1.0837 1.1743
## 152     77    4.000 3.9493  0.0507 0.0026
## 153     65    2.400 3.0418 -0.6418 0.4119
```

```
## 154     81    4.600 4.2518  0.3482 0.1212
## 155     71    3.567 3.4956  0.0714 0.0051
## 156     70    4.000 3.4199  0.5801 0.3365
## 157     81    4.500 4.2518  0.2482 0.0616
## 158     93    4.083 5.1594 -1.0764 1.1586
## 159     53    1.800 2.1343 -0.3343 0.1117
## 160     89    3.967 4.8569 -0.8899 0.7919
## 161     45    2.200 1.5292  0.6708 0.4499
## 162     86    4.150 4.6300 -0.4800 0.2304
## 163     58    2.000 2.5124 -0.5124 0.2626
## 164     78    3.833 4.0250 -0.1920 0.0369
## 165     66    3.500 3.1174  0.3826 0.1464
## 166     76    4.583 3.8737  0.7093 0.5031
## 167     63    2.367 2.8905 -0.5235 0.2741
## 168     88    5.000 4.7812  0.2188 0.0479
## 169     52    1.933 2.0586 -0.1256 0.0158
## 170     93    4.617 5.1594 -0.5424 0.2942
## 171     49    1.917 1.8318  0.0852 0.0073
## 172     57    2.083 2.4368 -0.3538 0.1252
## 173     77    4.583 3.9493  0.6337 0.4015
## 174     68    3.333 3.2687  0.0643 0.0041
## 175     81    4.167 4.2518 -0.0848 0.0072
## 176     81    4.333 4.2518  0.0812 0.0066
## 177     73    4.500 3.6468  0.8532 0.7279
## 178     50    2.417 1.9074  0.5096 0.2597
## 179     85    4.000 4.5544 -0.5544 0.3073
## 180     74    4.167 3.7225  0.4445 0.1976
## 181     55    1.883 2.2855 -0.4025 0.1620
## 182     77    4.583 3.9493  0.6337 0.4015
## 183     83    4.250 4.4031 -0.1531 0.0234
## 184     83    3.767 4.4031 -0.6361 0.4046
## 185     51    2.033 1.9830  0.0500 0.0025
## 186     78    4.433 4.0250  0.4080 0.1665
## 187     84    4.083 4.4787 -0.3957 0.1566
## 188     46    1.833 1.6049  0.2281 0.0520
## 189     83    4.417 4.4031  0.0139 0.0002
## 190     55    2.183 2.2855 -0.1025 0.0105
## 191     81    4.800 4.2518  0.5482 0.3005
## 192     57    1.833 2.4368 -0.6038 0.3645
## 193     76    4.800 3.8737  0.9263 0.8580
## 194     84    4.100 4.4787 -0.3787 0.1434
## 195     77    3.966 3.9493  0.0167 0.0003
## 196     81    4.233 4.2518 -0.0188 0.0004
## 197     87    3.500 4.7056 -1.2056 1.4535
## 198     77    4.366 3.9493  0.4167 0.1736
## 199     51    2.250 1.9830  0.2670 0.0713
## 200     78    4.667 4.0250  0.6420 0.4122
## 201     60    2.100 2.6637 -0.5637 0.3177
## 202     82    4.350 4.3275  0.0225 0.0005
## 203     91    4.133 5.0081 -0.8751 0.7658
## 204     53    1.867 2.1343 -0.2673 0.0714
## 205     78    4.600 4.0250  0.5750 0.3307
## 206     46    1.783 1.6049  0.1781 0.0317
## 207     77    4.367 3.9493  0.4177 0.1744
```

```
## 208     84    3.850 4.4787 -0.6287 0.3953
## 209     49    1.933 1.8318  0.1012 0.0103
## 210     83    4.500 4.4031  0.0969 0.0094
## 211     71    2.383 3.4956 -1.1126 1.2378
## 212     80    4.700 4.1762  0.5238 0.2743
## 213     49    1.867 1.8318  0.0352 0.0012
## 214     75    3.833 3.7981  0.0349 0.0012
## 215     64    3.417 2.9662  0.4508 0.2032
## 216     76    4.233 3.8737  0.3593 0.1291
## 217     53    2.400 2.1343  0.2657 0.0706
## 218     94    4.800 5.2350 -0.4350 0.1892
## 219     55    2.000 2.2855 -0.2855 0.0815
## 220     76    4.150 3.8737  0.2763 0.0763
## 221     50    1.867 1.9074 -0.0404 0.0016
## 222     82    4.267 4.3275 -0.0605 0.0037
## 223     54    1.750 2.2099 -0.4599 0.2115
## 224     75    4.483 3.7981  0.6849 0.4691
## 225     78    4.000 4.0250 -0.0250 0.0006
## 226     79    4.117 4.1006  0.0164 0.0003
## 227     78    4.083 4.0250  0.0580 0.0034
## 228     78    4.267 4.0250  0.2420 0.0586
## 229     70    3.917 3.4199  0.4971 0.2471
## 230     79    4.550 4.1006  0.4494 0.2020
## 231     70    4.083 3.4199  0.6631 0.4396
## 232     54    2.417 2.2099  0.2071 0.0429
## 233     86    4.183 4.6300 -0.4470 0.1998
## 234     50    2.217 1.9074  0.3096 0.0959
## 235     90    4.450 4.9325 -0.4825 0.2328
## 236     54    1.883 2.2099 -0.3269 0.1069
## 237     54    1.850 2.2099 -0.3599 0.1295
## 238     77    4.283 3.9493  0.3337 0.1113
## 239     79    3.950 4.1006 -0.1506 0.0227
## 240     64    2.333 2.9662 -0.6332 0.4009
## 241     75    4.150 3.7981  0.3519 0.1238
## 242     47    2.350 1.6805  0.6695 0.4482
## 243     86    4.933 4.6300  0.3030 0.0918
## 244     63    2.900 2.8905  0.0095 0.0001
## 245     85    4.583 4.5544  0.0286 0.0008
## 246     82    3.833 4.3275 -0.4945 0.2445
## 247     57    2.083 2.4368 -0.3538 0.1252
## 248     82    4.367 4.3275  0.0395 0.0016
## 249     67    2.133 3.1931 -1.0601 1.1237
## 250     74    4.350 3.7225  0.6275 0.3938
## 251     54    2.200 2.2099 -0.0099 0.0001
## 252     83    4.450 4.4031  0.0469 0.0022
## 253     73    3.567 3.6468 -0.0798 0.0064
## 254     73    4.500 3.6468  0.8532 0.7279
## 255     88    4.150 4.7812 -0.6312 0.3985
## 256     80    3.817 4.1762 -0.3592 0.1290
## 257     71    3.917 3.4956  0.4214 0.1776
## 258     83    4.450 4.4031  0.0469 0.0022
## 259     56    2.000 2.3611 -0.3611 0.1304
## 260     79    4.283 4.1006  0.1824 0.0333
## 261     78    4.767 4.0250  0.7420 0.5506
```

```
## 262     84    4.533 4.4787  0.0543 0.0029
## 263     58    1.850 2.5124 -0.6624 0.4388
## 264     83    4.250 4.4031 -0.1531 0.0234
## 265     43    1.983 1.3780  0.6050 0.3660
## 266     60    2.250 2.6637 -0.4137 0.1711
## 267     75    4.750 3.7981  0.9519 0.9062
## 268     81    4.117 4.2518 -0.1348 0.0182
## 269     46    2.150 1.6049  0.5451 0.2972
## 270     90    4.417 4.9325 -0.5155 0.2657
## 271     46    1.817 1.6049  0.2121 0.0450
## 272     74    4.467 3.7225  0.7445 0.5544
```

```
SSE <- sum(cuadro$res.2)
SSE
```

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

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

```
## [1] 0.246523
```

```
#revision que sean noramles
#que sean independientes
#constancias de alfa beta sean significativo
#establecer el error

# prueba de hipotesis de la regresion ------------------------------------
an.erup <-anova(lm.erup)
an.erup
```

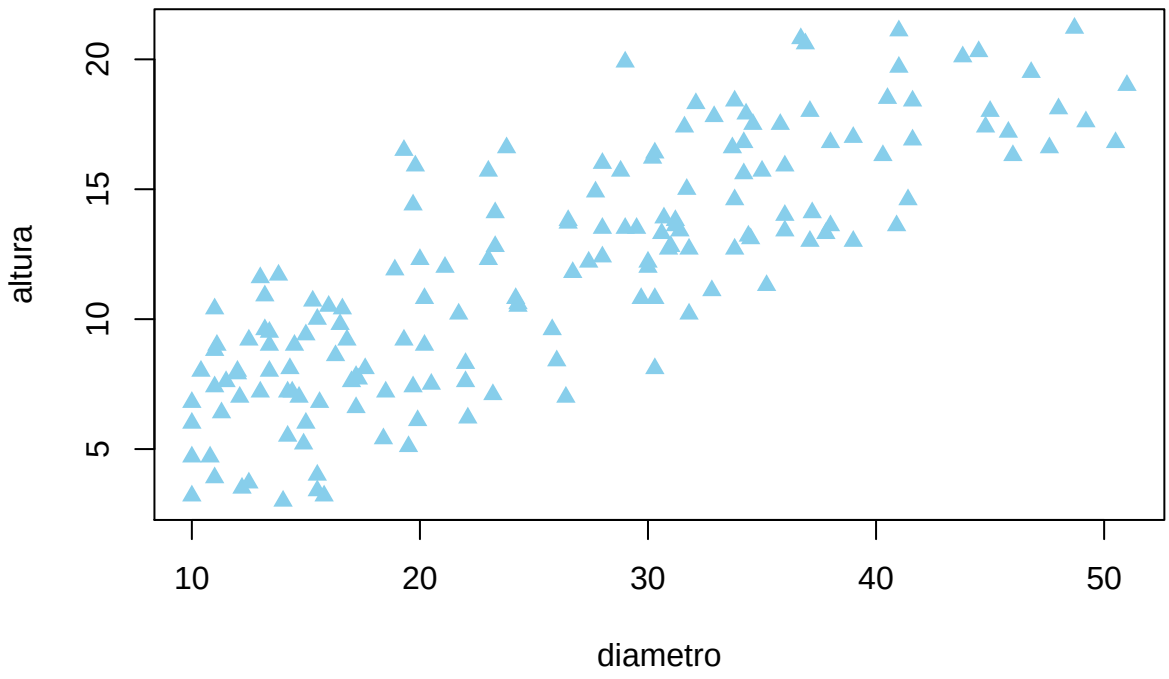
```
## Analysis of Variance Table
##
## Response: erupcion$eruptions
##                   Df  Sum Sq Mean Sq F value    Pr(>F)
## erupcion$waiting   1 286.478 286.478  1162.1 < 2.2e-16 ***
## Residuals        270  66.562   0.247
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1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

```
#regresion es signitifica
#F es 2.2e-16
#aceptamos la alternativa (H1)









# Ejercicio ebano ----------------------------------------------------------

#Base de datos ebano
ebano <- read.csv("C:/MCF202-2019/Clase4/ebanos.csV", header = T)
summary(ebano)
```

```
##     diametro         altura
```

```
##  Min.   :10.00   Min.   : 3.00
##  1st Qu.:15.57   1st Qu.: 8.00
##  Median :25.90   Median :12.00
##  Mean   :25.97   Mean   :11.89
##  3rd Qu.:34.23   3rd Qu.:15.75
##  Max.   :51.00   Max.   :21.20
```

```
plot(ebano$diametro, ebano$altura, xlab="diametro", ylab="altura", pch=17, col="sky blue")
```




```
# Determinar la estadistica de las variables ------------------------------
library(pastecs)
stat.desc (ebano$diametro)
```

```
##      nbr.val     nbr.null       nbr.na          min          max
##  164.0000000    0.0000000    0.0000000   10.0000000   51.0000000
##        range          sum       median         mean      SE.mean
##   41.0000000 4258.8000000   25.9000000   25.9682927    0.8620934
## CI.mean.0.95          var      std.dev     coef.var
##    1.7023108  121.8856142   11.0401818    0.4251408
```

```
stat.desc(ebano$diametro,basic=FALSE, norm=TRUE)
```

```
##        median          mean       SE.mean  CI.mean.0.95           var
##  2.590000e+01  2.596829e+01  8.620934e-01  1.702311e+00  1.218856e+02
##       std.dev      coef.var      skewness      skew.2SE      kurtosis
##  1.104018e+01  4.251408e-01  3.253519e-01  8.582025e-01 -9.701612e-01
##      kurt.2SE    normtest.W    normtest.p
## -1.286977e+00  9.492059e-01  1.215075e-05
```

```r
shapiro.test(log(ebano$diametro))
```

```
##
##  Shapiro-Wilk normality test
##
## data:  log(ebano$diametro)
## W = 0.95085, p-value = 1.689e-05
```

```r
#porque es la variable dependiente


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

```
##
##  Pearson's product-moment correlation
##
## data:  ebano$diametro and ebano$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
# Conclusion2 ----------------------------------------------------------

#Los datos no tiene distribucion normal
# Se acepta la H alternativa debido a que el valor de
#p es menor a 2.2e-16 el cual es menor al valor de alfa
#que es 0.05 lo cual quiere decir que si existen diferentes
#significativas (distribucion anormal)
```