Analisis de regresion

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Laboratorio #3: Modelos de Regresión en R

Ejercicio #1: utilizando R realice una función que dado un dataframe cualquiera de dos columnas, donde la primera (índice 1) sea el valor de la variable independiente (X) y la segunda sea el valor de una variable dependiente (Y), devuelva una lista con los siguientes elementos:

1. Un arreglo con los valores de los estimadores para B0 y B1".
2. El valor del coeficiente de determinación r^2 del modelo.
3. El coeficiente de correlación r (raíz cuadrada de r^2).
4. Un arreglo con los valores de los residuos.
5. Una gráfica con la nube de puntos y la recta de regresión del modelo.

Nota: Para este ejercicio NO está permitido utilizar la función lm()para calcular ninguno de los elementos solicitados (incisos 1 al 4), sin embargo puede utilizar ggplot para realizar la gráfica del inciso 5

La funcion lineal:

$$\overline{y} = \hat{\beta}_1 x + \hat{\beta}_0$$

Recuerde de su curso de Econometria que:

$$\hat{\beta}_1 = \frac{\sum_{i=1}^{n} x_i y_i - n\overline{xy}}{(\sum_{i=1}^{n} x_i^2) - n\overline{x}^2}$$

$x =$ valores conocido de la variable independiente

$y =$ valores conocido de la variable dependiente

$\overline{x} =$ promedio de valores de las x

$\overline{y} =$ promedio de valores de las y

$n =$ numero de datos puntuales u observaciones

$i = $ indice de la valuacion

$$\hat{\beta}_0 = \overline{y} - \hat{\beta}_1 \overline{x}$$

$$r^2 = \frac{\sum_{i=1}(\hat{y}_i - \overline{y_i})^2}{\sum_{i=1}(y_i - \overline{y_i})^2}$$

$$r = \sqrt{r}$$

Recuerde que n representa la cantidad de filas en el dataset

Leer el dataset

```
dataset = read.csv("grados.csv")

head(dataset)
```

```
##   Centígrados Farenheit
## 1           0      32.0
## 2           1      33.8
## 3           2      35.6
## 4           3      37.4
## 5           4      39.2
## 6           5      41.0
```

```
summary(dataset)
```

```
##   Centígrados      Farenheit
##  Min.   :  0.0   Min.   :  32.0
##  1st Qu.:249.8   1st Qu.: 481.6
##  Median :499.5   Median : 931.1
##  Mean   :499.5   Mean   : 931.1
##  3rd Qu.:749.2   3rd Qu.:1380.7
##  Max.   :999.0   Max.   :1830.2
```

```
# Cargar la biblioteca necesaria
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.2.3
```

```
# generar gráfico
ggplot(dataset, aes(x=Centígrados, y=Farenheit)) +
            geom_point()
```
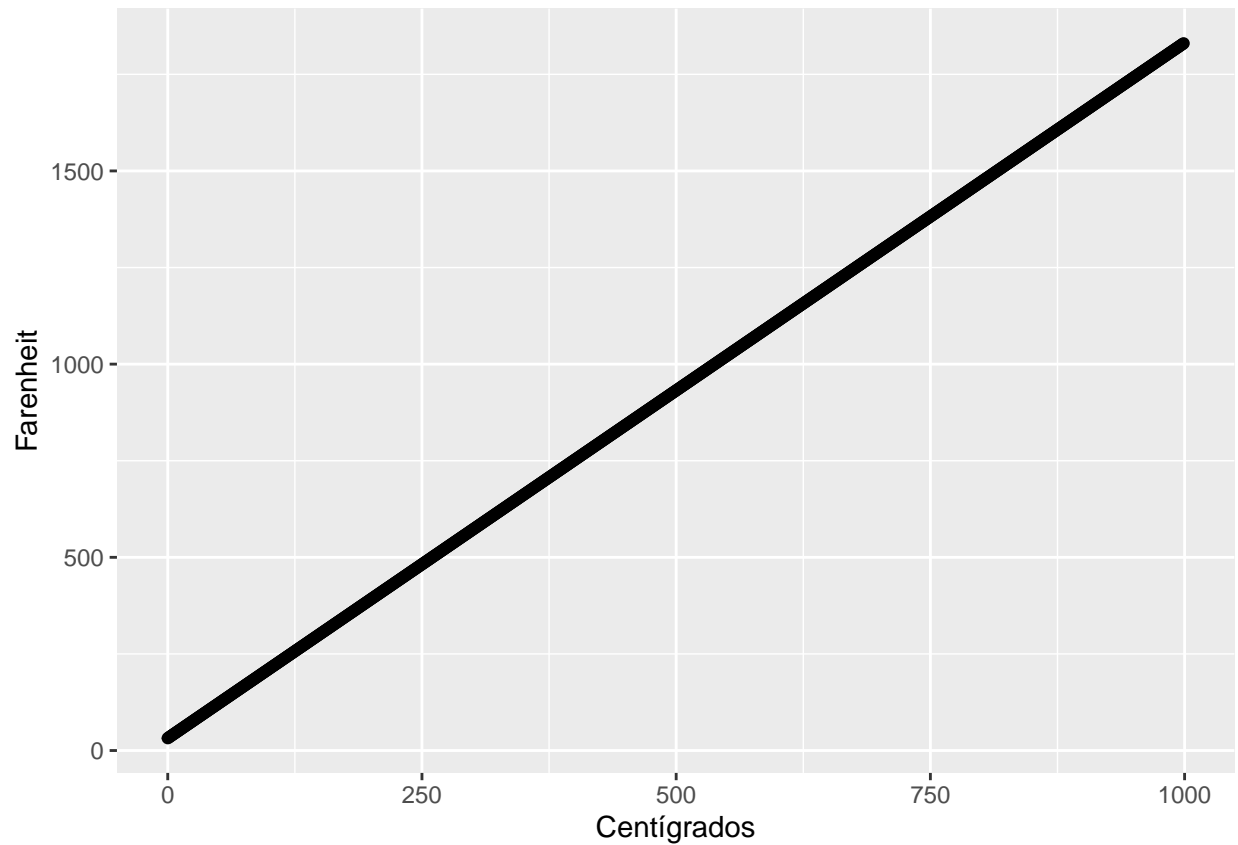
```r
# Crear algunos datos de ejemplo

x <- dataset$Centígrados
y <- dataset$Farenheit

# Calcular las medias
x_bar <- mean(x)
y_bar <- mean(y)

# Calcular las desviaciones
x_dev <- x - x_bar
y_dev <- y - y_bar

# Calcular los coeficientes de regresión
beta_1 <- sum(x_dev * y_dev) / sum(x_dev^2)
beta_0 <- y_bar - beta_1 * x_bar

# Crear un arreglo con los valores de los estimadores para B0 y B1
estimadores <- c(beta_0, beta_1)

# Calcular los valores predichos
y_predicha <- beta_0 + beta_1 * x

# Calcular los residuos
residuos <- y - y_predicha
```

```r
# Calcular R cuadrado
r_cuadrado <- 1 - sum(residuos^2) / sum((y - y_bar)^2)

# Calcular el coeficiente de correlación r
r <- sqrt(r_cuadrado)

# Crear una lista con los resultados
resultados <- list(estimadores = estimadores,
                   r_cuadrado = r_cuadrado,
                   r = r,
                   residuos = residuos)

# Imprimir los resultados
print(resultados)
```

```
## $estimadores
## [1] 32.0  1.8
##
## $r_cuadrado
## [1] 1
##
## $r
## [1] 1
##
## $residuos
##     [1]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##     [6]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##    [11]  0.000000e+00  0.000000e+00  0.000000e+00 -7.105427e-15  0.000000e+00
##    [16]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##    [21]  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00  0.000000e+00
##    [26]  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00  0.000000e+00
##    [31]  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00  0.000000e+00
##    [36]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [41]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [46]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [51]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [56]  0.000000e+00  0.000000e+00 -2.842171e-14  0.000000e+00  0.000000e+00
##    [61]  0.000000e+00  0.000000e+00 -2.842171e-14  0.000000e+00  0.000000e+00
##    [66]  0.000000e+00  0.000000e+00 -2.842171e-14  0.000000e+00  0.000000e+00
##    [71]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [76]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [81]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [86]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [91]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [96]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [101]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [106]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [111]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [116]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [121]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [126]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14
##   [131]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14
##   [136]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14
```

```
## [141]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [146]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [151]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [156]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [161]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [166]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [171]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [176]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [181]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [186]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [191]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [196]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [201]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [206]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [211]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [216]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [221]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [226]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [231]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [236]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [241]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [246]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [251]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [256]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [261]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
## [266]  0.000000e+00  0.000000e+00  0.000000e+00 -1.136868e-13  0.000000e+00
## [271]  0.000000e+00  0.000000e+00  0.000000e+00 -1.136868e-13  0.000000e+00
## [276]  0.000000e+00  0.000000e+00  0.000000e+00 -1.136868e-13  0.000000e+00
## [281]  0.000000e+00  0.000000e+00  0.000000e+00 -1.136868e-13  0.000000e+00
## [286]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [291]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [296]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [301]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [306]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [311]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [316]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [321]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [326]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [331]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [336]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [341]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [346]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [351]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [356]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [361]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [366]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [371]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [376]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [381]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [386]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [391]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [396]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [401]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [406]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
```

```
## [411]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [416]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [421]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [426]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [431]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [436]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [441]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [446]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [451]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [456]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [461]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [466]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [471]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [476]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [481]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [486]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [491]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [496]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [501]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [506]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [511]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [516]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [521]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [526]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [531]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [536]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [541]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [546]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [551]    0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [556]    0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [561]    0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [566]    0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [571]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [576]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [581]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [586]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [591]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [596]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [601]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [606]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [611]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [616]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [621]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [626]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [631]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [636]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [641]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [646]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [651]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [656]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [661]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [666]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [671]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [676]    0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
```

```
## [681]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [686]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [691]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [696]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [701]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [706]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [711]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [716]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [721]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [726]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [731]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [736]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [741]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [746]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [751]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [756]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [761]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [766]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [771]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [776]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [781]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [786]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [791]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [796]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [801]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [806]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [811]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [816]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [821]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [826]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [831]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [836]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [841]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [846]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [851]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [856]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [861]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [866]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [871]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [876]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [881]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [886]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [891]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [896]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [901]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [906]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [911]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [916]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [921]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [926]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [931]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [936]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [941]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [946]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
```

```
## [951]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [956]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [961]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [966]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [971]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [976]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [981]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [986]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [991]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [996]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
```

```r
# Crear el gráfico
library(ggplot2)
dataset <- data.frame(x = x, y = y, y_predicha = y_predicha)
grafico <- ggplot(dataset, aes(x = x, y = y)) +
           geom_point() +
           geom_line(aes(x = x, y = y_predicha), color = "red")
grafico
```
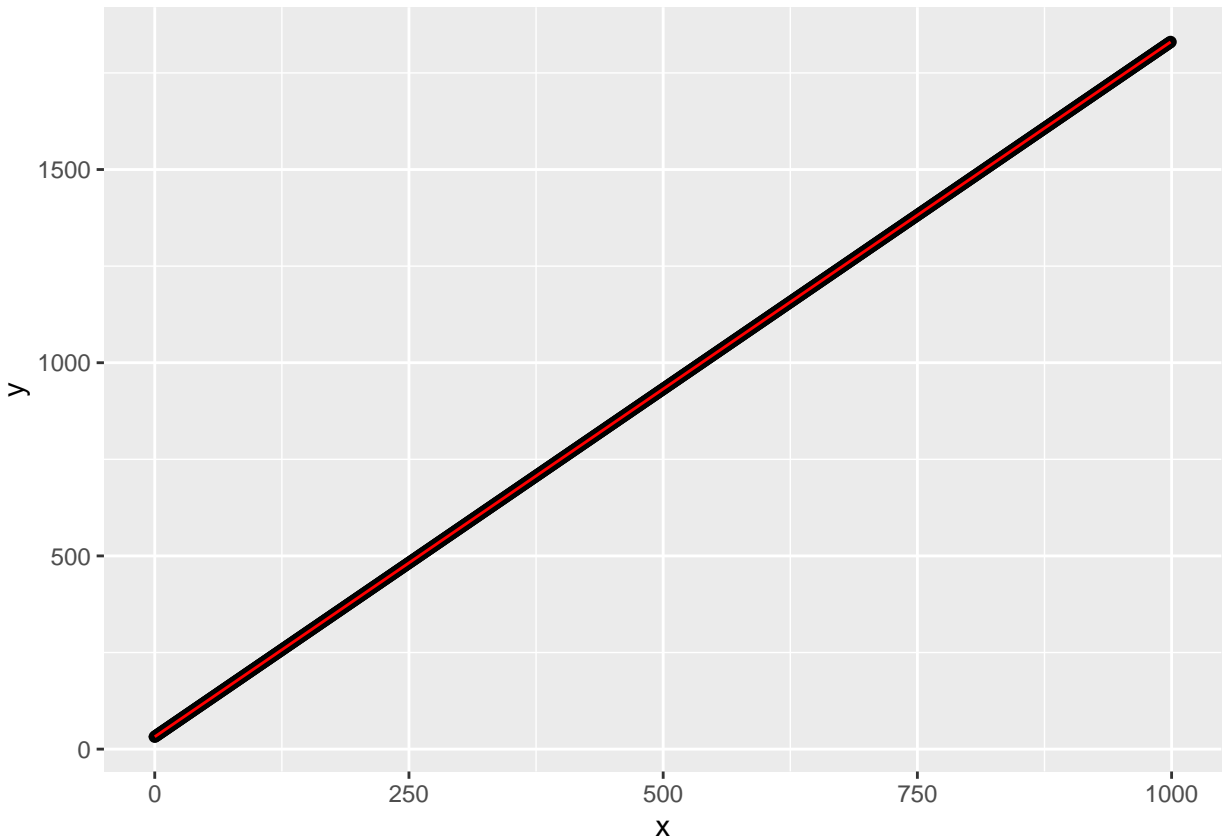


```r
head(data.frame(B0 = beta_0,
                B1 = beta_1,
                R_Cuadrado = r_cuadrado,
                R = r,
                Residuos = list(residuos)) )
```

```
##   B0  B1 R_Cuadrado R
```

```
## 1 32 1.8          1 1
## 2 32 1.8          1 1
## 3 32 1.8          1 1
## 4 32 1.8          1 1
## 5 32 1.8          1 1
## 6 32 1.8          1 1
##   c.0..0..0..0..0..0..0..0..0..0..0..0..0...7.105427357601e.15..
## 1                                                              0
## 2                                                              0
## 3                                                              0
## 4                                                              0
## 5                                                              0
## 6                                                              0
```

```r
summary(data.frame(B0 = beta_0,
                   B1 = beta_1,
                   R_Cuadrado = r_cuadrado,
                   R = r,
                   Residuos = list(residuos)) )
```

```
##        B0           B1         R_Cuadrado        R
##  Min.   :32   Min.   :1.8   Min.   :1    Min.   :1
##  1st Qu.:32   1st Qu.:1.8   1st Qu.:1    1st Qu.:1
##  Median :32   Median :1.8   Median :1    Median :1
##  Mean   :32   Mean   :1.8   Mean   :1    Mean   :1
##  3rd Qu.:32   3rd Qu.:1.8   3rd Qu.:1    3rd Qu.:1
##  Max.   :32   Max.   :1.8   Max.   :1    Max.   :1
##  c.0..0..0..0..0..0..0..0..0..0..0..0..0...7.105427357601e.15..
##  Min.   :-2.274e-13
##  1st Qu.: 0.000e+00
##  Median : 0.000e+00
##  Mean   :-2.893e-14
##  3rd Qu.: 0.000e+00
##  Max.   : 0.000e+00
```

Resumen

1. Un arreglo con los valores de los estimadores para B0 y B1".

```r
arreglo = c(beta_0, beta_1)
arreglo
```

```
## [1] 32.0  1.8
```

2. El valor del coeficiente de determinación r^2 del modelo.

```r
r_cuadrado
```

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

3. El coeficiente de correlación r (raíz cuadrada de r^2).

```
r
```

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

4. Un arreglo con los valores de los residuos.

```
residuos
```

```
##     [1]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##     [6]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##    [11]  0.000000e+00  0.000000e+00  0.000000e+00 -7.105427e-15  0.000000e+00
##    [16]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00
##    [21]  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00  0.000000e+00
##    [26]  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00  0.000000e+00
##    [31]  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00  0.000000e+00
##    [36]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [41]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [46]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [51]  0.000000e+00  0.000000e+00 -1.421085e-14  0.000000e+00  0.000000e+00
##    [56]  0.000000e+00  0.000000e+00 -2.842171e-14  0.000000e+00  0.000000e+00
##    [61]  0.000000e+00  0.000000e+00 -2.842171e-14  0.000000e+00  0.000000e+00
##    [66]  0.000000e+00  0.000000e+00 -2.842171e-14  0.000000e+00  0.000000e+00
##    [71]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [76]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [81]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [86]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [91]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##    [96]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [101]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [106]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [111]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [116]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [121]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -2.842171e-14
##   [126]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14
##   [131]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14
##   [136]  0.000000e+00  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14
##   [141]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [146]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [151]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [156]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [161]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [166]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [171]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [176]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [181]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [186]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [191]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [196]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [201]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [206]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
##   [211]  0.000000e+00  0.000000e+00  0.000000e+00 -5.684342e-14  0.000000e+00
```

```
## [216]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [221]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [226]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [231]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [236]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [241]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [246]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [251]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [256]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [261]   0.000000e+00   0.000000e+00   0.000000e+00  -5.684342e-14   0.000000e+00
## [266]   0.000000e+00   0.000000e+00   0.000000e+00  -1.136868e-13   0.000000e+00
## [271]   0.000000e+00   0.000000e+00   0.000000e+00  -1.136868e-13   0.000000e+00
## [276]   0.000000e+00   0.000000e+00   0.000000e+00  -1.136868e-13   0.000000e+00
## [281]   0.000000e+00   0.000000e+00   0.000000e+00  -1.136868e-13   0.000000e+00
## [286]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [291]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [296]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [301]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [306]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [311]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [316]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [321]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [326]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [331]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [336]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [341]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [346]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [351]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [356]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [361]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [366]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [371]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [376]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [381]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [386]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [391]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [396]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [401]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [406]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [411]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [416]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [421]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [426]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [431]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [436]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [441]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [446]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [451]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [456]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [461]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [466]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [471]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [476]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
## [481]   0.000000e+00  -1.136868e-13   0.000000e+00   0.000000e+00   0.000000e+00
```

```
## [486]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [491]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [496]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [501]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [506]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [511]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [516]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [521]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [526]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [531]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [536]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [541]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [546]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [551]  0.000000e+00 -1.136868e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [556]  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [561]  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [566]  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00  0.000000e+00
## [571]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [576]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [581]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [586]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [591]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [596]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [601]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [606]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [611]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [616]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [621]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [626]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [631]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [636]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [641]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [646]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [651]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [656]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [661]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [666]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [671]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [676]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [681]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [686]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [691]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [696]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [701]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [706]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [711]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [716]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [721]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [726]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [731]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [736]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [741]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [746]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
## [751]  0.000000e+00  0.000000e+00 -2.273737e-13  0.000000e+00  0.000000e+00
```

```
## [756]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [761]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [766]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [771]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [776]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [781]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [786]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [791]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [796]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [801]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [806]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [811]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [816]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [821]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [826]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [831]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [836]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [841]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [846]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [851]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [856]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [861]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [866]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [871]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [876]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [881]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [886]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [891]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [896]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [901]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [906]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [911]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [916]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [921]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [926]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [931]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [936]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [941]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [946]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [951]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [956]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [961]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [966]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [971]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [976]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [981]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [986]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [991]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
## [996]   0.000000e+00   0.000000e+00  -2.273737e-13   0.000000e+00   0.000000e+00
```

5. Una gráfica con la nube de puntos y la recta de regresión del modelo.

grafico