Ejercicio 1

```r
SMP  <- c(10,30, 033, 966, NA)
CALLENOMBRE  <-  c(4519, NA, NA, 966,966)
CALLEALTURA  <-  c(4519, NA, 5640, 1418, 966)
df<-data.frame(SMP,CALLENOMBRE,CALLEALTURA)
```

```r
contar_los_NA<-function(df){
  filas_df<-dim(df)[1]
  columnas_df<-dim(df)[2]
  matriz_nueva<-matrix(0,ncol=columnas_df,nrow=1)
  data_frame_nuevo<-as.data.frame(matriz_nueva)
  colnames(data_frame_nuevo) <- colnames(df)
  vector_suma_na<-numeric(columnas_df)
  vector_suma_na[]<-0
    for (i in 1:filas_df){
    mascara <- is.na(df[i, ])
    vector_suma_na<-vector_suma_na+as.logical(mascara)
  }

  #Ahora que ya tengo ese vector de los NA, relleno el DF nuevo con esos datos
  data_frame_nuevo[1,]<-data_frame_nuevo[1,]+vector_suma_na
  return(data_frame_nuevo)
}

contar_los_NA(df)
```

1- Construya una función con dos argumentos, un dataframe/matriz de entrada y un dataframe/matriz de salida. La función deberá devolver un objeto (dataframe/matriz) que contenga en cada columna la cantidad de valores NA que existen en cada columna homónima del dataframe original.

```
##   SMP CALLENOMBRE CALLEALTURA
## 1   1           2           1
```

Ejercicio 2

```r
library(dplyr)
```

a- Haga una función en la que tenga cuatro argumentos, un dataframe de entrada, un dataframe de salida y dos numeros "N" y "n". La función debe extraer "N" muestreos aleatorios de tamaño "n". De cada muestra aleatoria calcule la media, la varianza y la moda e incorpore cada uno de estos resultados en el dataframe de salida que contenga columnas llamadas igual que la base original y que tenga una fila para las medias obtenidas por el sampleo.

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

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
calcular_moda<-function(vector){
  valores_unicos<- unique(vector)
  cantidad<- sapply(valores_unicos, function(val) sum(vector == val, na.rm = T))
  moda <- valores_unicos[which.max(cantidad)]
  return(moda)
}

ejercicio_2<-function(df_entrada,N,n){
    num_filas <- nrow(df_entrada)
    num_columnas<-ncol(df_entrada)
    if (N <= 0 || n >= num_filas) {
    cat("Los valores de la cantidad de muestras deben ser positivos y el tamanio debe ser menor a la can
    return(invisible(0))
  }
    matriz_de_salida<-matrix(0,ncol=num_columnas,nrow=N)#mismas lineas como muestreos hago porque pide p
    data_frame_salida<-as.data.frame(matriz_de_salida)
    colnames(data_frame_salida) <- colnames(df_entrada)
  for(i in 1:N){
    indices_aleatorios <- sample(1:num_filas,n)
    filas_aleatorias <- df_entrada[indices_aleatorios, ]

    #Calculo la moda y la varianza de cada columna
    varianza_por_columna<-apply(filas_aleatorias, 2, var, na.rm = TRUE)
    moda_por_columna<-sapply(filas_aleatorias,calcular_moda)

    #Mean de cada columna del muestreo aleatorio y completarlo en el DF nuevo
    promedio_por_columna<-colMeans(filas_aleatorias, na.rm = TRUE)
    data_frame_salida[i,]<-promedio_por_columna
    row_name <- paste("media muestreo", i)
    rownames(data_frame_salida)[i] <- row_name
    }
    return(data_frame_salida)
}

irisnum<-iris[,-5]
respuesta_2<-ejercicio_2(irisnum,15,5)
respuesta_2
```

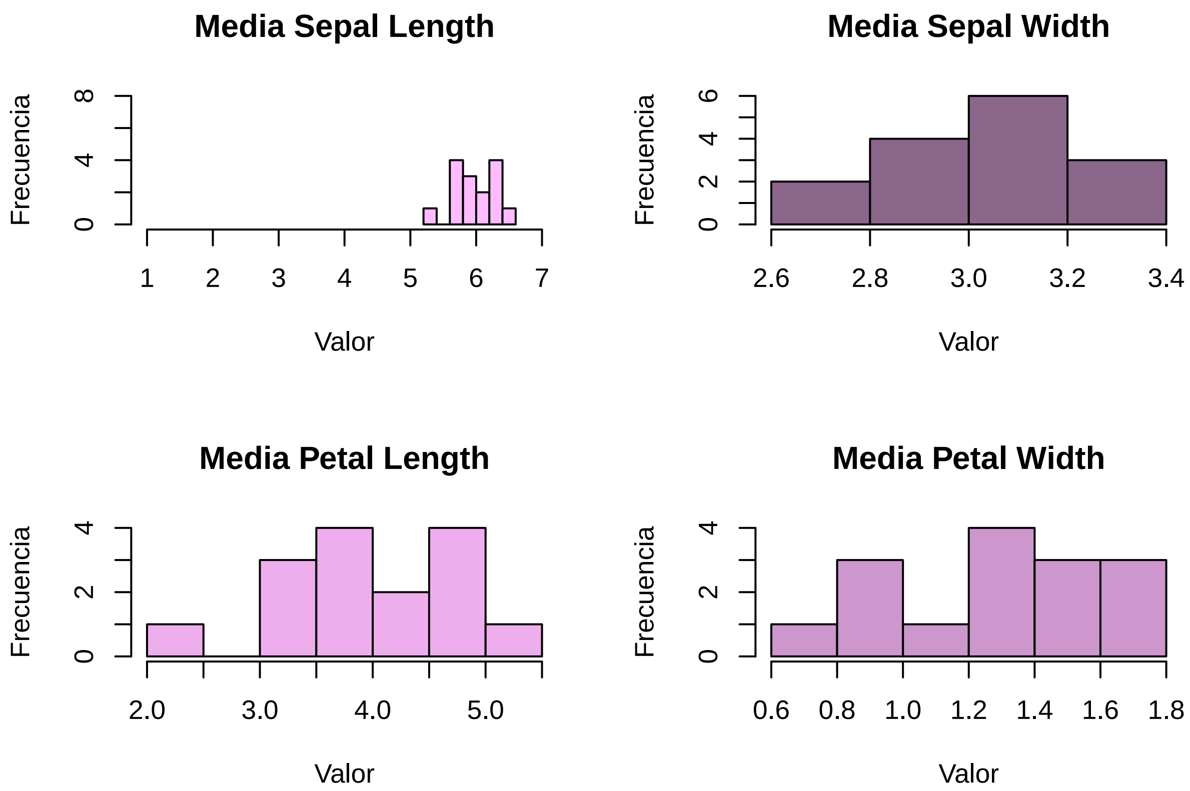
```
##                   Sepal.Length Sepal.Width Petal.Length Petal.Width
## media muestreo 1          5.72        2.90         4.34        1.58
## media muestreo 2          6.28        2.62         4.90        1.68
## media muestreo 3          5.90        3.04         3.42        0.98
```

```
## media muestreo 4          6.10        3.08         3.84        1.22
## media muestreo 5          5.72        3.40         3.12        0.98
## media muestreo 6          5.76        3.04         3.92        1.34
## media muestreo 7          6.22        3.20         4.08        1.24
## media muestreo 8          6.18        2.66         4.68        1.42
## media muestreo 9          5.32        3.38         2.24        0.62
## media muestreo 10         6.00        3.26         3.60        1.02
## media muestreo 11         6.34        3.14         4.88        1.60
## media muestreo 12         5.62        2.82         3.50        1.00
## media muestreo 13         6.42        2.94         5.06        1.70
## media muestreo 14         6.40        2.86         4.66        1.72
## media muestreo 15         6.00        3.10         3.76        1.30
```

b- Del resultado del punto a) haga un resumen estadístico y un histograma para cada variable (construya un grafico multiple con los cuatro histogramas) (Para cada columna de Iris)

```r
par(mfrow = c(2, 2))

hist(respuesta_2$Sepal.Length, col = "plum1", xlim = c(1, 7), ylim = c(0, 8), main = "Media Sepal Lengt
hist(respuesta_2$Sepal.Width, col = "plum4", main = "Media Sepal Width",xlab = "Valor", ylab = "Frecuen
hist(respuesta_2$Petal.Length, col = "plum2", main = "Media Petal Length",xlab = "Valor", ylab = "Frecu
hist(respuesta_2$Petal.Width, col = "plum3", main = "Media Petal Width",xlab = "Valor", ylab = "Frecuen
```



c- Modifique la función del punto a) para que el tamaño de la muestra sea aleatorio. Dentro de la funcion puedo cambiar los "n" por sample(1:10,1) Suponiendo que el tamanio de la muestra puede estar entre 1 y 15

```
ejercicio_2_c<-function(df_entrada,N){
    if (N <= 0) {
    cat("Los valores de la cantidad de muestras N deben ser positivos")
    return(invisible(0))
  }

    num_filas <- nrow(df_entrada)
    num_columnas<-ncol(df_entrada)
    matriz_de_salida<-matrix(0,ncol=num_columnas,nrow=N)#mismas lineas como muestreos hago porque pide
    data_frame_salida<-as.data.frame(matriz_de_salida)
    colnames(data_frame_salida) <- colnames(df_entrada)
  for(i in 1:N){
    indices_aleatorios <- sample(1:num_filas,sample(1:15,1))
    filas_aleatorias <- df_entrada[indices_aleatorios, ]

    #Calculo la moda y la varianza de cada columna
    varianza_por_columna<-apply(filas_aleatorias, 2, var, na.rm = TRUE)
    moda_por_columna<-sapply(filas_aleatorias,calcular_moda)

    #Mean de cada columna del muestreo aleatorio y completarlo en el DF         nuevo
    promedio_por_columna<-colMeans(filas_aleatorias, na.rm = TRUE)
    data_frame_salida[i,]<-promedio_por_columna
    row_name <- paste("media muestreo", i)
    rownames(data_frame_salida)[i] <- row_name
    }
    return(data_frame_salida)
}
respuesta_2_c<-ejercicio_2_c(irisnum,15)
respuesta_2_c
```

```
##                   Sepal.Length Sepal.Width Petal.Length Petal.Width
## media muestreo 1      5.857143    2.978571     3.742857   1.2000000
## media muestreo 2      5.941667    3.216667     3.641667   1.1416667
## media muestreo 3      6.020000    2.920000     4.120000   1.1600000
## media muestreo 4      6.055556    3.033333     4.144444   1.4666667
## media muestreo 5      5.641667    3.400000     2.958333   0.9250000
## media muestreo 6      5.820000    3.340000     3.640000   1.2600000
## media muestreo 7      5.881818    3.109091     3.409091   0.9909091
## media muestreo 8      5.555556    3.133333     3.100000   0.9777778
## media muestreo 9      5.950000    2.800000     4.166667   1.3166667
## media muestreo 10     5.700000    2.975000     3.275000   0.9500000
## media muestreo 11     6.466667    3.016667     4.566667   1.5000000
## media muestreo 12     5.800000    3.600000     3.000000   0.8000000
## media muestreo 13     5.892857    3.035714     4.000000   1.3285714
## media muestreo 14     6.900000    3.200000     5.700000   2.3000000
## media muestreo 15     5.757143    3.128571     3.114286   0.9857143
```

Ejercicio 3: Matrices

```r
library(wooldridge)
```

Installe el paquete "wooldridge" y utilice la base de datos Wage1 corriendo la línea

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

```r
base_de_datos <-data("wage1")
base_de_datos <-wage1
```

```r
library(dplyr)
help(wage1)
```

Estos son datos de la Encuesta de Población Actual de 1976, recopilada por Henry Farber cuando él y Wooldridge fueron colegas en el MIT en 1988. Haga un help sobre la base y describa de que se trata esta base, que tipo de variables tiene, cuantas variables tiene? Use no mas de tres renglones

```
## starting httpd help server ... done
```

```r
#Para mostrar tipo de dato de las columnas
wage1 %>% str()
```

```
## 'data.frame':    526 obs. of  24 variables:
##  $ wage    : num  3.1 3.24 3 6 5.3 ...
##  $ educ    : int  11 12 11 8 12 16 18 12 12 17 ...
##  $ exper   : int  2 22 2 44 7 9 15 5 26 22 ...
##  $ tenure  : int  0 2 0 28 2 8 7 3 4 21 ...
##  $ nonwhite: int  0 0 0 0 0 0 0 0 0 0 ...
##  $ female  : int  1 1 0 0 0 0 0 1 1 0 ...
##  $ married : int  0 1 0 1 1 1 0 0 0 1 ...
##  $ numdep  : int  2 3 2 0 1 0 0 0 2 0 ...
##  $ smsa    : int  1 1 0 1 0 1 1 1 1 1 ...
##  $ northcen: int  0 0 0 0 0 0 0 0 0 0 ...
##  $ south   : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ west    : int  1 1 1 1 1 1 1 1 1 1 ...
##  $ construc: int  0 0 0 0 0 0 0 0 0 0 ...
##  $ ndurman : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ trcommpu: int  0 0 0 0 0 0 0 0 0 0 ...
##  $ trade   : int  0 0 1 0 0 0 1 0 1 0 ...
##  $ services: int  0 1 0 0 0 0 0 0 0 0 ...
##  $ profserv: int  0 0 0 0 0 1 0 0 0 0 ...
##  $ profocc : int  0 0 0 0 0 1 1 1 1 1 ...
##  $ clerocc : int  0 0 0 1 0 0 0 0 0 0 ...
##  $ servocc : int  0 1 0 0 0 0 0 0 0 0 ...
##  $ lwage   : num  1.13 1.18 1.1 1.79 1.67 ...
##  $ expersq : int  4 484 4 1936 49 81 225 25 676 484 ...
##  $ tenursq : int  0 4 0 784 4 64 49 9 16 441 ...
##  - attr(*, "time.stamp")= chr "25 Jun 2011 23:03"
```

Se trata de un analisis de la sociedad. Para eso tomo una muestra de 526 observacioens y presento 24 variables que toman valores int (que no aceptan numero decimal) o num (aceptan valor decimal). Muchas variables se usan para ver si pertenecen o no a una categoria (1 o 0).

```
#Y es el nombre de la columna del Data Frame

#Segmento utilizado como input
wage<-wage1[-c(520:526),]

funcion_ej_3<-function(dataframe,Y){
  nombre_columnas_df<-colnames(dataframe)
  if(!(Y %in% nombre_columnas_df)){
    cat("El nombre de columna",Y, "no existe")
    return(invisible(0))
  }
  else{
    columna_y <- dataframe[, Y]
    if (!is.numeric(columna_y)) {
    cat("La columna", Y, "no contiene valores numéricos")
    return(invisible(0))}

    X <- as.matrix(dataframe[, -which(names(dataframe) == Y)])
    resultado <- solve(t(X) %*% X) %*% (t(X) %*% columna_y)
    return(resultado)
  }


}

funcion_ej_3(wage,"trade")
```

Construya una función que realice la siguiente operación sobre un dataframe, siendo "Y", la primera columna del dataframe (trate que la selección de la variable Y sea uno de los argumentos de la función) y "X" las columnas 2 a 6 del dataframe. Resultado=[inv(transpuesta(X)*X)]*[transuesta(X)*Y]

```
##                    [,1]
## wage     -4.122554e-02
## educ      3.562497e-02
## exper     2.096769e-03
## tenure   -3.269377e-04
## nonwhite -9.497841e-03
## female    1.785561e-02
## married  -3.160727e-02
## numdep    2.067082e-02
## smsa      3.503382e-02
## northcen  4.206055e-02
## south     9.605107e-02
## west     -3.281817e-04
## construc -5.448576e-01
## ndurman  -6.020516e-01
```

```
## trcommpu -6.692724e-01
## services -6.641825e-01
## profserv -7.374682e-01
## profocc   1.963100e-01
## clerocc   1.665543e-01
## servocc   2.398366e-01
## lwage     1.251171e-01
## expersq   3.355573e-06
## tenursq  -3.195191e-05
```

Ejercicio 4

```r
ejercicio_4<- function(data_frame){
  nueva_matriz<-data_frame[,1:4]
  columnas_al_cuadrado<-nueva_matriz^2
  columnas_centralizadas<-nueva_matriz-colMeans(nueva_matriz)
  columnas_estandarizadas<-scale(nueva_matriz,center = T,scale=T)

  nombres_originales <- colnames(nueva_matriz)
  nuevos_nombres <- c(nombres_originales,
  paste("cuadrado", nombres_originales),
  paste("centralizado", nombres_originales),
  paste("estandarizado", nombres_originales)
  )

  rta<-cbind(nueva_matriz,columnas_al_cuadrado,columnas_centralizadas,
             columnas_estandarizadas)
  colnames(rta) <- nuevos_nombres
  return(as.matrix(rta))

}

ejercicio_4(wage)
```

Haga una función que tome las primeras cuatro columnas s de la base wage (del punto 3 como input) y cree una matriz nueva en la cual, a la matriz original (wage), adicione el cuadrado de cada variable, y las variables centralizadas (variable menos la media) y cada variable estandarizada (variable menos la media y dividido por el desvío estándar)

```
##     wage educ exper tenure cuadrado wage cuadrado educ cuadrado exper
## 1   3.10   11     2      0      9.609999           121              4
## 2   3.24   12    22      2     10.497600           144            484
## 3   3.00   11     2      0      9.000000           121              4
## 4   6.00    8    44     28     36.000000            64           1936
## 5   5.30   12     7      2     28.090002           144             49
## 6   8.75   16     9      8     76.562500           256             81
## 7  11.25   18    15      7    126.562500           324            225
## 8   5.00   12     5      3     25.000000           144             25
## 9   3.60   12    26      4     12.959999           144            676
## 10 18.18   17    22     21    330.512411           289            484
```

```
## 11   6.25  16   8   2  39.062500     256    64
## 12   8.13  13   3   0  66.096902     169     9
## 13   8.77  12  15   0  76.912908     144   225
## 14   5.50  12  18   3  30.250000     144   324
## 15  22.20  12  31  15 492.840034     144   961
## 16  17.33  16  14   0 300.328897     256   196
## 17   7.50  12  10   0  56.250000     144   100
## 18  10.63  13  16  10 112.996902     169   256
## 19   3.60  12  13   0  12.959999     144   169
## 20   4.50  12  36   6  20.250000     144  1296
## 21   6.88  12  11   4  47.334402     144   121
## 22   8.48  12  29  13  71.910392     144   841
## 23   6.33  16   9   9  40.068899     256    81
## 24   0.53  12   3   1   0.280900     144     9
## 25   6.00  11  37   8  36.000000     121  1369
## 26   9.56  16   3   3  91.393608     256     9
## 27   7.78  16  11  10  60.528403     256   121
## 28  12.50  16  31   0 156.250000     256   961
## 29  12.50  15  30   0 156.250000     225   900
## 30   3.25   8   9   1  10.562500      64    81
## 31  13.00  14  23   5 169.000000     196   529
## 32   4.50  14   2   5  20.250000     196     4
## 33   9.68  13  16  16  93.702406     169   256
## 34   5.00  12   7   3  25.000000     144    49
## 35   4.68  12   3   0  21.902398     144     9
## 36   4.27  16  22   4  18.232900     256   484
## 37   6.15  12  15   6  37.822501     144   225
## 38   3.51   4  39  15  12.320100      16  1521
## 39   3.00  14   3   3   9.000000     196     9
## 40   6.25  12  11   0  39.062500     144   121
## 41   7.81  12   3   0  60.996099     144     9
## 42  10.00  12  20   5 100.000000     144   400
## 43   4.50  14  16   0  20.250000     196   256
## 44   4.00  11  45  12  16.000000     121  2025
## 45   6.38  13  11   4  40.704401     169   121
## 46  13.70  15  20  13 187.689995     225   400
## 47   1.67  10   1   0   2.788900     100     1
## 48   2.93  12  36   2   8.584900     144  1296
## 49   3.65  14   9   2  13.322501     196    81
## 50   2.90  12  15   1   8.410001     144   225
## 51   1.63  12  18   0   2.656900     144   324
## 52   8.60  16   3   2  73.960007     256     9
## 53   5.00  12  15   5  25.000000     144   225
## 54   6.00  12   7   7  36.000000     144    49
## 55   2.50  12   2   0   6.250000     144     4
## 56   3.25  15   3   0  10.562500     225     9
## 57   3.40  16   1   1  11.560001     256     1
## 58  10.00   8  13   0 100.000000      64   169
## 59  21.63  18   8   8 467.856864     324    64
## 60   4.38  16   7   0  19.184401     256    49
## 61  11.71  13  40  20 137.124101     169  1600
## 62  12.39  14  42   5 153.512109     196  1764
## 63   6.25  10  36   8  39.062500     100  1296
## 64   3.71  10  13   0  13.764100     100   169
```

```
## 65   7.78  14   9   3   60.528403        196         81
## 66  19.98  14  26  23  399.200382        196        676
## 67   6.25  16   7   4   39.062500        256         49
## 68  10.00  12  25   3  100.000000        144        625
## 69   5.71  16  10   5   32.604100        256        100
## 70   2.00  12   3   2    4.000000        144          9
## 71   5.71  16   3   0   32.604100        256          9
## 72  13.08  17  17   2  171.086398        289        289
## 73   4.91  12  17   8   24.108099        144        289
## 74   2.91  12  20  34    8.468100        144        400
## 75   3.75  12   7   0   14.062500        144         49
## 76  11.90  13  24  19  141.609991        169        576
## 77   4.00  12  28   0   16.000000        144        784
## 78   3.10  12   2   1    9.609999        144          4
## 79   8.45  12  19  13   71.402497        144        361
## 80   7.14  18  13   0   50.979598        324        169
## 81   4.50   9  22   5   20.250000         81        484
## 82   4.65  16   3   1   21.622501        256          9
## 83   2.90  10   4   0    8.410001        100         16
## 84   6.67  12   7   5   44.488901        144         49
## 85   3.50  12   6   2   12.250000        144         36
## 86   3.26  12  13   3   10.627600        144        169
## 87   3.25  12  14   0   10.562500        144        196
## 88   8.00  12  14   4   64.000000        144        196
## 89   9.85   8  40  24   97.022508         64       1600
## 90   7.50  12  11   7   56.250000        144        121
## 91   5.91  12  14   6   34.928098        144        196
## 92  11.76  14  40  39  138.297605        196       1600
## 93   3.00  12   1   0    9.000000        144          1
## 94   4.81  12   2   0   23.136099        144          4
## 95   6.50  12   4   1   42.250000        144         16
## 96   4.00   9  19   1   16.000000         81        361
## 97   3.50  13   1   0   12.250000        169          1
## 98  13.16  12  34  22  173.185596        144       1156
## 99   4.25  14   5   2   18.062500        196         25
## 100  3.50  12   3   0   12.250000        144          9
## 101  5.13  15   6   6   26.316901        225         36
## 102  3.75  12  14   0   14.062500        144        196
## 103  4.50  12  35  12   20.250000        144       1225
## 104  7.63  12   8   4   58.216902        144         64
## 105 15.00  14   7   7  225.000000        196         49
## 106  6.85  15  11   3   46.922499        225        121
## 107 13.33  12  14  11  177.688898        144        196
## 108  6.67  12  35  10   44.488901        144       1225
## 109  2.53  12  46   0    6.400900        144       2116
## 110  9.80  17   7   0   96.040004        289         49
## 111  3.37  11  45  12   11.356899        121       2025
## 112 24.98  18  29  25  624.000377        324        841
## 113  5.40  12   6   3   29.160001        144         36
## 114  6.11  14  15   0   37.332102        196        225
## 115  4.20  14  33  16   17.639998        196       1089
## 116  3.75  10  15   0   14.062500        100        225
## 117  3.50  14   5   0   12.250000        196         25
## 118  3.64  12   7   2   13.249601        144         49
```

```
## 119  3.80  15   6   1   14.440000          225          36
## 120  3.00   8  33  12    9.000000           64        1089
## 121  5.00  16   2   1   25.000000          256           4
## 122  4.63  14   4   0   21.436901          196          16
## 123  3.00  15   1   0    9.000000          225           1
## 124  3.20  12  29   0   10.240000          144         841
## 125  3.91  18  17   3   15.288101          324         289
## 126  6.43  16  17   3   41.344898          256         289
## 127  5.48  10  36   3   30.030400          100        1296
## 128  1.50   8  31  30    2.250000           64         961
## 129  2.90  10  23   2    8.410001          100         529
## 130  5.00  11  13   1   25.000000          121         169
## 131  8.92  18   3   3   79.566401          324           9
## 132  5.00  15  15   0   25.000000          225         225
## 133  3.52  12  48   1   12.390400          144        2304
## 134  2.90  11   6   0    8.410001          121          36
## 135  4.50  12  12   0   20.250000          144         144
## 136  2.25  12   5   0    5.062500          144          25
## 137  5.00  14  19   5   25.000000          196         361
## 138 10.00  16   9   3  100.000000          256          81
## 139  3.75   2  39  13   14.062500            4        1521
## 140 10.00  14  28  11  100.000000          196         784
## 141 10.95  16  23  20  119.902496          256         529
## 142  7.90  12   2   0   62.410002          144           4
## 143  4.72  12  15   1   22.278398          144         225
## 144  5.84  13   5   0   34.105602          169          25
## 145  3.83  12  18   2   14.668899          144         324
## 146  3.20  15   2   2   10.240000          225           4
## 147  2.00  10   3   0    4.000000          100           9
## 148  4.50  12  31   4   20.250000          144         961
## 149 11.55  16  20   5  133.402504          256         400
## 150  2.14  13  34  15    4.579600          169        1156
## 151  2.38   9   5   0    5.664401           81          25
## 152  3.75  12  11   0   14.062500          144         121
## 153  5.52  13  31   3   30.470400          169         961
## 154  6.50  12   8   5   42.250000          144          64
## 155  3.10  12   2   2    9.609999          144           4
## 156 10.00  14  18   5  100.000000          196         324
## 157  6.63  16   3   0   43.956902          256           9
## 158 10.00  16   3   2  100.000000          256           9
## 159  2.31   9   4   1    5.336100           81          16
## 160  6.88  18   4   4   47.334402          324          16
## 161  2.83  10   1   0    8.008900          100           1
## 162  3.13  10   1   0    9.796901          100           1
## 163  8.00  13  28   5   64.000000          169         784
## 164  4.50  12  47   4   20.250000          144        2209
## 165  8.65  18  13   1   74.822493          324         169
## 166  2.00  13   2   6    4.000000          169           4
## 167  4.75  12  48   2   22.562500          144        2304
## 168  6.25  13   6   5   39.062500          169          36
## 169  6.00  13   8   0   36.000000          169          64
## 170 15.38  13  25  21  236.544404          169         625
## 171 14.58  18  13   7  212.576398          324         169
## 172 12.50  12   8   1  156.250000          144          64
```

```
## 173  5.25  12  19  10  27.562500  144   361
## 174  2.17  13   1   4   4.708900  169     1
## 175  7.14  12  43   5  50.979598  144  1849
## 176  6.22  12  19   9  38.688397  144   361
## 177  9.00  12  11   5  81.000000  144   121
## 178 10.00  14  43   4 100.000000  196  1849
## 179  5.77  10  44   3  33.292900  100  1936
## 180  4.00  12  22  11  16.000000  144   484
## 181  8.75  16   3   2  76.562500  256     9
## 182  6.53  16   3   2  42.640903  256     9
## 183  7.60  12  41  11  57.759999  144  1681
## 184  5.00  14   5   0  25.000000  196    25
## 185  5.00  12  14  11  25.000000  144   196
## 186 21.86  12  24  16 477.859627  144   576
## 187  8.64  12  28   8  74.649606  144   784
## 188  3.30  12  25   8  10.890000  144   625
## 189  4.44  12   3   0  19.713601  144     9
## 190  4.55  12  11   0  20.702502  144   121
## 191  3.50  12   7   6  12.250000  144    49
## 192  6.25  16   9   2  39.062500  256    81
## 193  3.85  16   5   0  14.822499  256    25
## 194  6.18  14   9   3  38.192398  196    81
## 195  2.91  11   1   0   8.468100  121     1
## 196  6.25  16   2   1  39.062500  256     4
## 197  6.25  12  13   0  39.062500  144   169
## 198  9.05  12  10   2  81.902503  144   100
## 199 10.00  17   5   3 100.000000  289    25
## 200 11.11  12  30   8 123.432092  144   900
## 201  6.88  12  31  19  47.334402  144   961
## 202  8.75  16   1   2  76.562500  256     1
## 203 10.00   8   9   0 100.000000   64    81
## 204  3.05  12  10   0   9.302500  144   100
## 205  3.00  12  38   0   9.000000  144  1444
## 206  5.80  12  19   6  33.640002  144   361
## 207  4.10  16   5   0  16.809999  256    25
## 208  8.00  12  26   2  64.000000  144   676
## 209  6.15  12  35  12  37.822501  144  1225
## 210  2.70   9   2   0   7.290000   81     4
## 211  2.75  13   1   2   7.562500  169     1
## 212  3.00  16  19  10   9.000000  256   361
## 213  3.00  14   3   2   9.000000  196     9
## 214  7.36   8  36  24  54.169602   64  1296
## 215  7.50  14  29  24  56.250000  196   841
## 216  3.50  13   1   2  12.250000  169     1
## 217  8.10  12  38   3  65.610006  144  1444
## 218  3.75  18   1   2  14.062500  324     1
## 219  3.25   9  29   0  10.562500   81   841
## 220  5.83   8  36  15  33.988899   64  1296
## 221  3.50   8   4   0  12.250000   64    16
## 222  3.33  12  45   4  11.088899  144  2025
## 223  4.00  14  22   3  16.000000  196   484
## 224  3.50  12  20   4  12.250000  144   400
## 225  6.25  16   5   0  39.062500  256    25
## 226  2.95   8  15   2   8.702500   64   225
```

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## 227  5.71   13    10       2     32.604100           169            100
## 228  3.00    9     3       0      9.000000            81              9
## 229 22.86   16    16       7    522.579628           256            256
## 230  9.00   12    38       1     81.000000           144           1444
## 231  8.33   15    33      26     69.388899           225           1089
## 232  3.00   11     2       0      9.000000           121              4
## 233  5.75   14     6       5     33.062500           196             36
## 234  6.76   12    19       3     45.697603           144            361
## 235 10.00   12    29       0    100.000000           144            841
## 236  3.00   12     2       0      9.000000           144              4
## 237  3.50   18     3       1     12.250000           324              9
## 238  3.25   12     4       0     10.562500           144             16
## 239  4.00   12    10       1     16.000000           144            100
## 240  2.92   12     4       0      8.526400           144             16
## 241  3.06   12    14      10      9.363600           144            196
## 242  3.20   12    15       5     10.240000           144            225
## 243  4.75   12    19       0     22.562500           144            361
## 244  3.00   14    17       0      9.000000           196            289
## 245 18.16   16    29       7    329.785594           256            841
## 246  3.50   12     2       0     12.250000           144              4
## 247  4.11   14     5       0     16.892101           196             25
## 248  1.96   11    38       3      3.841600           121           1444
## 249  4.29   12     3       0     18.404100           144              9
## 250  3.00   10    47       0      9.000000           100           2209
## 251  6.45   12     7       6     41.602498           144             49
## 252  5.20    6    47      13     27.039998            36           2209
## 253  4.50   13    23       2     20.250000           169            529
## 254  3.88   12    12       3     15.054401           144            144
## 255  3.45   10    11       0     11.902500           100            121
## 256 10.91   12    25      23    119.028097           144            625
## 257  4.10   14     6       0     16.809999           196             36
## 258  3.00   13     3       1      9.000000           169              9
## 259  5.90   12    14       7     34.810001           144            196
## 260 18.00   18    13       0    324.000000           324            169
## 261  4.00   12     9       0     16.000000           144             81
## 262  3.00   12     1       0      9.000000           144              1
## 263  3.55   12     6       0     12.602500           144             36
## 264  3.00   12    11       1      9.000000           144            121
## 265  8.75   12    47      44     76.562500           144           2209
## 266  2.90    8    49       6      8.410001            64           2401
## 267  6.26   13    37      17     39.187603           169           1369
## 268  3.50   13     2       0     12.250000           169              4
## 269  4.60   14     7       0     21.159999           196             49
## 270  6.00   12    22       8     36.000000           144            484
## 271  2.89   10     8       0      8.352101           100             64
## 272  5.58   16     1       1     31.136399           256              1
## 273  4.00   12    43       6     16.000000           144           1849
## 274  6.00   16     2       2     36.000000           256              4
## 275  4.50   12     2       1     20.250000           144              4
## 276  2.92   14     1       3      8.526400           196              1
## 277  4.33   18     1       0     18.748899           324              1
## 278 18.89   17    26      20    356.832077           289            676
## 279  4.28   13     1       1     18.318402           169              1
## 280  4.57   14    37       7     20.884902           196           1369
```

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## 281  6.25   15    12      4     39.062500           225           144
## 282  2.95   14    41     23      8.702500           196          1681
## 283  8.75   12    24      1     76.562500           144           576
## 284  8.50    8    38     26     72.250000            64          1444
## 285  3.75   12    18      0     14.062500           144           324
## 286  3.15   12    26      1      9.922501           144           676
## 287  5.00    8    45      2     25.000000            64          2025
## 288  6.46   12    27      0     41.731600           144           729
## 289  2.00    9     2      0      4.000000            81             4
## 290  4.79   12    41      8     22.944100           144          1681
## 291  5.78   16    11      4     33.408402           256           121
## 292  3.18   12     5      0     10.112400           144            25
## 293  4.68   16     3      1     21.902398           256             9
## 294  4.10   12     3      2     16.809999           144             9
## 295  2.91   12     4      0      8.468100           144            16
## 296  6.00   13    21     13     36.000000           169           441
## 297  3.60   10    34     26     12.959999           100          1156
## 298  3.95    6    49      6     15.602500            36          2401
## 299  7.00   12     6      5     49.000000           144            36
## 300  3.00   12    26      9      9.000000           144           676
## 301  6.08   16     9      0     36.966399           256            81
## 302  8.63   12    23      9     74.476902           144           529
## 303  3.00    8    33      2      9.000000            64          1089
## 304  3.75   12     5      2     14.062500           144            25
## 305  2.90    6    49      7      8.410001            36          2401
## 306  3.00    4    48      0      9.000000            16          2304
## 307  6.25   11    35     31     39.062500           121          1225
## 308  3.50   11    23      2     12.250000           121           529
## 309  3.00    7    26      1      9.000000            49           676
## 310  3.24   12    16      0     10.497600           144           256
## 311  8.02   18    23      3     64.320407           324           529
## 312  3.33   12    36      8     11.088899           144          1296
## 313  5.25   16     4      0     27.562500           256            16
## 314  6.25   12    10      0     39.062500           144           100
## 315  3.50   14    18      2     12.250000           196           324
## 316  2.95   12     3      1      8.702500           144             9
## 317  3.00   10     7      0      9.000000           100            49
## 318  4.69   10     7      7     21.996101           100            49
## 319  3.73    9    33      2     13.912900            81          1089
## 320  4.00   10    34     12     16.000000           100          1156
## 321  4.00   12     8      0     16.000000           144            64
## 322  2.90   12    17      1      8.410001           144           289
## 323  3.05   12     2      0      9.302500           144             4
## 324  5.05   10     5      0     25.502502           100            25
## 325 13.95   16    41     16    194.602495           256          1681
## 326 18.16   16    35     28    329.785594           256          1225
## 327  6.25   16    11      4     39.062500           256           121
## 328  5.25   12     4      0     27.562500           144            16
## 329  4.79   12    12      3     22.944100           144           144
## 330  3.35    7    35      0     11.222499            49          1225
## 331  3.00    8    33      0      9.000000            64          1089
## 332  8.43   16     8      6     71.064905           256            64
## 333  5.70   16     2      0     32.489998           256             4
## 334 11.98   18     8     10    143.520389           324            64
```

```
## 335  3.50  13  29   1   12.250000      169       841
## 336  4.24  10  14   5   17.977598      100       196
## 337  7.00  16  26   3   49.000000      256       676
## 338  6.00  14  11   3   36.000000      196       121
## 339 12.22  16  10   2  149.328407      256       100
## 340  4.50  12  13   0   20.250000      144       169
## 341  3.00   9  23  20    9.000000       81       529
## 342  2.90  11   1   2    8.410001      121         1
## 343 15.00  11  35  31  225.000000      121      1225
## 344  4.00  12   5   2   16.000000      144        25
## 345  5.25  11  13  11   27.562500      121       169
## 346  4.00  12  22   3   16.000000      144       484
## 347  3.30  12  21   9   10.890000      144       441
## 348  5.05  12  19   0   25.502502      144       361
## 349  3.58  12  13   0   12.816399      144       169
## 350  5.00  14  15   5   25.000000      196       225
## 351  4.57  14   3   0   20.884902      196         9
## 352 12.50  18   6   2  156.250000      324        36
## 353  3.45  12   6   5   11.902500      144        36
## 354  4.63  12  16   1   21.436901      144       256
## 355 10.00  12  31   2  100.000000      144       961
## 356  2.92  11   1   0    8.526400      121         1
## 357  4.51  12   5   2   20.340102      144        25
## 358  6.50  17   3   0   42.250000      289         9
## 359  7.50  16  11   0   56.250000      256       121
## 360  3.54  13   6   7   12.531600      169        36
## 361  4.20  13  11   3   17.639998      169       121
## 362  3.51  12   7   2   12.320100      144        49
## 363  4.50  14   5   0   20.250000      196        25
## 364  3.35  14   5   4   11.222499      196        25
## 365  2.91  11   2   2    8.468100      121         4
## 366  5.25  10  44   7   27.562500      100      1936
## 367  4.05   8  44  25   16.402502       64      1936
## 368  3.75  14  13   0   14.062500      196       169
## 369  3.40  12  26  15   11.560001      144       676
## 370  3.00  10   2   1    9.000000      100         4
## 371  6.29  17  10   3   39.564100      289       100
## 372  2.54   9   2   0    6.451600       81         4
## 373  4.50  12  35   0   20.250000      144      1225
## 374  3.13  12   6   5    9.796901      144        36
## 375  6.36  14   8   1   40.449602      196        64
## 376  4.68  16   1   0   21.902398      256         1
## 377  6.80  12  14  10   46.240003      144       196
## 378  8.53  10  14   6   72.760895      100       196
## 379  4.17   0  22  10   17.388901        0       484
## 380  3.75  14   8   4   14.062500      196        64
## 381 11.10  15   1   4  123.210008      225         1
## 382  3.26  16  15   5   10.627600      256       225
## 383  9.13  12  14  12   83.356902      144       196
## 384  4.50  11  37  10   20.250000      121      1369
## 385  3.00  11   1   1    9.000000      121         1
## 386  8.75  12   4   4   76.562500      144        16
## 387  4.14  13  29   0   17.139599      169       841
## 388  2.87  12  45   8    8.236899      144      2025
```

```
## 389  3.35  13   22    0   11.222499       169       484
## 390  6.08  16   42   10   36.966399       256      1764
## 391  3.00  15    9    0    9.000000       225        81
## 392  4.20  16    8    0   17.639998       256        64
## 393  5.60  15   31   15   31.359999       225       961
## 394 10.00  12   24   24  100.000000       144       576
## 395 12.50  18   16    5  156.250000       324       256
## 396  3.76   6    6    0   14.137600        36        36
## 397  3.10   6   14    0    9.609999        36       196
## 398  4.29  12   47   25   18.404100       144      2209
## 399 10.92  12   34    5  119.246402       144      1156
## 400  7.50  16    6    2   56.250000       256        36
## 401  4.05   9    7    4   16.402502        81        49
## 402  4.65  12   27    2   21.622501       144       729
## 403  5.00  11   24    5   25.000000       121       576
## 404  2.90  10   18    0    8.410001       100       324
## 405  8.00  12   12    3   64.000000       144       144
## 406  8.43   8   27    3   71.064905        64       729
## 407  2.92   9   49    0    8.526400        81      2401
## 408  6.25  17    4    0   39.062500       289        16
## 409  6.25  16   24    2   39.062500       256       576
## 410  5.11  11    3    0   26.112101       121         9
## 411  4.00  10    2    0   16.000000       100         4
## 412  4.44   8   29   11   19.713601        64       841
## 413  6.88  13   34   21   47.334402       169      1156
## 414  5.43  14   10    3   29.484898       196       100
## 415  3.00  13    5    0    9.000000       169        25
## 416  2.90  11    2    0    8.410001       121         4
## 417  6.25   7   39   21   39.062500        49      1521
## 418  4.34  16    5    2   18.835601       256        25
## 419  3.25  12   14    2   10.562500       144       196
## 420  7.26  13    8    2   52.707603       169        64
## 421  6.35  14   10    1   40.322499       196       100
## 422  5.63  16    2    2   31.696901       256         4
## 423  8.75  14    9    3   76.562500       196        81
## 424  3.20  11    1    0   10.240000       121         1
## 425  3.00   8   45    1    9.000000        64      2025
## 426  3.00  14   33    3    9.000000       196      1089
## 427 12.50  17   21   18  156.250000       289       441
## 428  2.88  10    2    0    8.294401       100         4
## 429  3.35  12    9    1   11.222499       144        81
## 430  6.50  12   33    2   42.250000       144      1089
## 431 10.38  18   16    2  107.744402       324       256
## 432  4.50  14   10    0   20.250000       196       100
## 433 10.00  18    9    8  100.000000       324        81
## 434  3.81  12    8    1   14.516100       144        64
## 435  8.80  16    9    1   77.440003       256        81
## 436  9.42  14   23    0   88.736401       196       529
## 437  6.33  12   23    8   40.068899       144       529
## 438  4.00   9   22   18   16.000000        81       484
## 439  2.90  12   37    0    8.410001       144      1369
## 440 20.00  12   22    4  400.000000       144       484
## 441 11.25  17   28   25  126.562500       289       784
## 442  3.50  12   14    0   12.250000       144       196
```

```
## 443  6.00  15  19   4  36.000000   225   361
## 444 14.38  17  10   9 206.784403   289   100
## 445  6.36  16  25   0  40.449602   256   625
## 446  3.55  12  21   0  12.602500   144   441
## 447  3.00  15  32   0   9.000000   225  1024
## 448  4.50  16  21  10  20.250000   256   441
## 449  6.63  12  36   0  43.956902   144  1296
## 450  9.30  15   2   2  86.490004   225     4
## 451  3.00  12  11   0   9.000000   144   121
## 452  3.25  12  40   2  10.562500   144  1600
## 453  1.50  12  11   1   2.250000   144   121
## 454  5.90  12   9   7  34.810001   144    81
## 455  8.00  16  23   4  64.000000   256   529
## 456  2.90  11   1   0   8.410001   121     1
## 457  3.29  14  30  13  10.824100   196   900
## 458  6.50  14  41  33  42.250000   196  1681
## 459  4.00  13   6   0  16.000000   169    36
## 460  6.00  14  11   0  36.000000   196   121
## 461  4.08  12  43  17  16.646399   144  1849
## 462  3.75  12  39   2  14.062500   144  1521
## 463  3.05   8  50  24   9.302500    64  2500
## 464  3.50  12  26  20  12.250000   144   676
## 465  2.92   3  51  30   8.526400     9  2601
## 466  4.50  11   3   9  20.250000   121     9
## 467  3.35  15   3   1  11.222499   225     9
## 468  5.95  11  15   9  35.402498   121   225
## 469  8.00  12  17   6  64.000000   144   289
## 470  3.00   4  36   0   9.000000    16  1296
## 471  5.00   9  31   9  25.000000    81   961
## 472  5.50  12   9   4  30.250000   144    81
## 473  2.65  12  42  10   7.022501   144  1764
## 474  3.00  11   3   0   9.000000   121     9
## 475  4.50  12  37  14  20.250000   144  1369
## 476 17.50  16  23  22 306.250000   256   529
## 477  8.18  13  21   5  66.912405   169   441
## 478  9.09  15  11  12  82.628103   225   121
## 479 11.82  16  35  13 139.712393   256  1225
## 480  3.25  12  42   0  10.562500   144  1764
## 481  4.50  12   3   0  20.250000   144     9
## 482  4.50  12  13   0  20.250000   144   169
## 483  3.71   9  14   7  13.764100    81   196
## 484  6.50  10  14  11  42.250000   100   196
## 485  2.90  12  39   1   8.410001   144  1521
## 486  5.60  11  11   8  31.359999   121   121
## 487  2.23   8  28   3   4.972900    64   784
## 488  5.00   6  18   0  25.000000    36   324
## 489  8.33  16   6   2  69.388899   256    36
## 490  2.90  12  26   1   8.410001   144   676
## 491  6.25  12  21   6  39.062500   144   441
## 492  4.55  16  34   2  20.702502   256  1156
## 493  3.28  12  17   2  10.758400   144   289
## 494  2.30  10   2   0   5.290000   100     4
## 495  3.30  13   5   0  10.890000   169    25
## 496  3.15  13   1   0   9.922501   169     1
```

```
## 497 12.50   14    40     30    156.250000            196           1600
## 498  5.15   16    39     21     26.522501            256           1521
## 499  3.13   10     1      1      9.796901            100              1
## 500  7.25   12    14      5     52.562500            144            196
## 501  2.90   12     2      2      8.410001            144              4
## 502  1.75   11     2      1      3.062500            121              4
## 503  2.89    0    42      0      8.352101              0           1764
## 504  2.90    5    34      0      8.410001             25           1156
## 505 17.71   16    10      3    313.644068            256            100
## 506  6.25   16     4      3     39.062500            256             16
## 507  2.60    9     4      0      6.760000             81             16
## 508  6.63   15    21      3     43.956902            225            441
## 509  3.50   12    31      3     12.250000            144            961
## 510  6.50   12    20     14     42.250000            144            400
## 511  3.00   12    36      1      9.000000            144           1296
## 512  4.38   13     7      0     19.184401            169             49
## 513 10.00   12    15      0    100.000000            144            225
## 514  4.95    7    25     17     24.502498             49            625
## 515  9.00   17     7      0     81.000000            289             49
## 516  1.43   12    17      0      2.044900            144            289
## 517  3.08   12     3      1      9.486400            144              9
## 518  9.33   14    12     11     87.048899            196            144
## 519  7.50   12    18      5     56.250000            144            324
##     cuadrado tenure centralizado wage centralizado educ centralizado exper
## 1                 0       -2.78429683        5.87668593       -15.07707129
## 2                 4       -9.30720616        6.11570326        16.87668593
## 3                 0      -14.07707129       -1.54720617        -3.88429674
## 4               784        0.87668593       -9.07707129        31.45279383
## 5                 4       -0.58429655        6.87668593       -10.07707129
## 6                64       -3.79720617       10.11570326         3.87668593
## 7                49       -5.82707129        5.45279383         9.11570326
## 8                 9       -0.12331407       -5.07707129        -7.54720617
## 9                16       -2.28429683        6.87668593         8.92292871
## 10              441        5.63279414       11.11570326        16.87668593
## 11                4      -10.82707129        3.45279383         2.11570326
## 12                0        3.00668605       -4.07707129        -9.54720617
## 13                0        2.88570372        6.87668593        -2.07707129
## 14                9       -7.04720617        6.11570326        12.87668593
## 15              225        5.12292947       -0.54720617        25.11570326
## 16                0       12.20668586       -1.07707129         1.45279383
## 17                0        1.61570326        6.87668593        -7.07707129
## 18              100       -1.91720605        7.11570326        10.87668593
## 19                0      -13.47707139       -0.54720617         7.11570326
## 20               36       -0.62331407       -5.07707129        23.45279383
## 21               16        0.99570338        6.87668593        -6.07707129
## 22              169       -4.06720662        6.11570326        23.87668593
## 23               81      -10.74707137        3.45279383         3.11570326
## 24                1       -4.59331409       -5.07707129        -9.54720617
## 25               64        0.11570326        5.87668593        19.92292871
## 26                9       -2.98720575       10.11570326        -2.12331407
## 27              100       -9.29707108        3.45279383         5.11570326
## 28                0        7.37668593       -1.07707129        18.45279383
## 29                0        6.61570326        9.87668593        12.92292871
## 30                1       -9.29720617        2.11570326         3.87668593
```

```
## 31              25    -4.07707129     1.45279383    17.11570326
## 32              25    -0.62331407    -3.07707129   -10.54720617
## 33             256     3.79570357     7.87668593    -1.07707129
## 34               9    -7.54720617     6.11570326     1.87668593
## 35               0   -12.39707146    -0.54720617    -2.88429674
## 36              16    -0.85331408    -1.07707129     9.45279383
## 37              36     0.26570336     6.87668593    -2.07707129
## 38             225    -9.03720618    -1.88429674    33.87668593
## 39               9   -14.07707129     1.45279383    -2.88429674
## 40               0     1.12668593    -5.07707129    -1.54720617
## 41               0     1.92570321     6.87668593   -14.07707129
## 42              25    -2.54720617     6.11570326    14.87668593
## 43               0   -12.57707129     1.45279383    10.11570326
## 44             144    -1.12331407    -6.07707129    32.45279383
## 45              16     0.49570338     7.87668593    -6.07707129
## 46             169     1.15279364     9.11570326    14.87668593
## 47               0   -15.40707133    -2.54720617    -4.88429674
## 48               4    -2.19331400    -5.07707129    23.45279383
## 49               4    -2.23429664     8.87668593    -8.07707129
## 50               1    -9.64720607     6.11570326     9.87668593
## 51               0   -15.44707130    -0.54720617    12.11570326
## 52               4     3.47668632    -1.07707129    -9.54720617
## 53              25    -0.88429674     6.87668593    -2.07707129
## 54              49    -6.54720617     6.11570326     1.87668593
## 55               0   -14.57707129    -0.54720617    -3.88429674
## 56               0    -1.87331407    -2.07707129    -9.54720617
## 57               1    -2.48429664    10.87668593   -16.07707129
## 58               0    -2.54720617     2.11570326     7.87668593
## 59              64     4.55292787     5.45279383     2.11570326
## 60               0    -0.74331395    -1.07707129    -5.54720617
## 61             400     5.82570330     7.87668593    22.92292871
## 62              25    -0.15720582     8.11570326    36.87668593
## 63              64   -10.82707129    -2.54720617    30.11570326
## 64               0    -1.41331403    -7.07707129     0.45279383
## 65               9     1.89570347     8.87668593    -8.07707129
## 66             529     7.43279338     8.11570326    20.87668593
## 67              16   -10.82707129     3.45279383     1.11570326
## 68               9     4.87668593    -5.07707129    12.45279383
## 69              25    -0.17429670    10.87668593    -7.07707129
## 70               4   -10.54720617     6.11570326    -2.12331407
## 71               0   -11.36707125     3.45279383    -2.88429674
## 72               4     7.95668586    -0.07707129     4.45279383
## 73              64    -0.97429689     6.87668593    -0.07707129
## 74            1156    -9.63720608     6.11570326    14.87668593
## 75               0   -13.32707129    -0.54720617     1.11570326
## 76             361     6.77668555    -4.07707129    11.45279383
## 77               0    -1.88429674     6.87668593    10.92292871
## 78               1    -9.44720626     6.11570326    -3.12331407
## 79             169    -8.62707148    -0.54720617    13.11570326
## 80               0     2.01668580     0.92292871     0.45279383
## 81              25    -1.38429674     3.87668593     4.92292871
## 82               1    -7.89720607    10.11570326    -2.12331407
## 83               0   -14.17707120    -2.54720617    -1.88429674
## 84              25     1.54668601    -5.07707129    -5.54720617
```

```
## 85             4    -2.38429674    6.87668593   -11.07707129
## 86             9    -9.28720618    6.11570326     7.87668593
## 87             0   -13.82707129   -0.54720617     8.11570326
## 88            16     2.87668593   -5.07707129     1.45279383
## 89           576     3.96570364    2.87668593    22.92292871
## 90            49    -5.04720617    6.11570326     5.87668593
## 91            36   -11.16707144   -0.54720617     8.11570326
## 92          1521     6.63668616   -3.07707129    27.45279383
## 93             0    -2.88429674    6.87668593   -16.07707129
## 94             0    -7.73720622    6.11570326    -3.12331407
## 95             1   -10.57707129   -0.54720617    -1.88429674
## 96             1    -1.12331407   -8.07707129     6.45279383
## 97             0    -2.38429674    7.87668593   -16.07707129
## 98           484     0.61279368    6.11570326    28.87668593
## 99             4   -12.82707129    1.45279383    -0.88429674
## 100            0    -1.62331407   -5.07707129    -9.54720617
## 101           36    -0.75429662    9.87668593   -11.07707129
## 102            0    -8.79720617    6.11570326     8.87668593
## 103          144   -12.57707129   -0.54720617    29.11570326
## 104           16     2.50668605   -5.07707129    -4.54720617
## 105           49     9.11570326    8.87668593   -10.07707129
## 106            9    -5.69720626    9.11570326     5.87668593
## 107          121    -3.74707137   -0.54720617     8.11570326
## 108          100     1.54668601   -5.07707129    22.45279383
## 109            0    -3.35429677    6.87668593    28.92292871
## 110            0    -2.74720597   11.11570326     1.87668593
## 111          144   -13.70707141   -1.54720617    39.11570326
## 112          625    19.85668548    0.92292871    16.45279383
## 113            9    -0.48429664    6.87668593   -11.07707129
## 114            0    -6.43720603    8.11570326     9.87668593
## 115          256   -12.87707148    1.45279383    27.11570326
## 116            0    -1.37331407   -7.07707129     2.45279383
## 117            0    -2.38429674    8.87668593   -12.07707129
## 118            4    -8.90720606    6.11570326     1.87668593
## 119            1   -13.27707134    2.45279383     0.11570326
## 120          144    -2.12331407   -9.07707129    20.45279383
## 121            1    -0.88429674   10.87668593   -15.07707129
## 122            0    -7.91720605    8.11570326    -1.12331407
## 123            0   -14.07707129    2.45279383    -4.88429674
## 124            0    -1.92331402   -5.07707129    16.45279383
## 125            9    -1.97429665   12.87668593    -0.07707129
## 126            9    -6.11720634   10.11570326    11.87668593
## 127            9   -11.59707127   -2.54720617    30.11570326
## 128          900    -3.62331407   -9.07707129    18.45279383
## 129            4    -2.98429664    4.87668593     5.92292871
## 130            1    -7.54720617    5.11570326     7.87668593
## 131            9    -8.15707121    5.45279383    -2.88429674
## 132            0    -0.12331407   -2.07707129     2.45279383
## 133            1    -2.36429676    6.87668593    30.92292871
## 134            0    -9.64720607    5.11570326     0.87668593
## 135            0   -12.57707129   -0.54720617     6.11570326
## 136            0    -2.87331407   -5.07707129    -7.54720617
## 137           25    -0.88429674    8.87668593     1.92292871
## 138            9    -2.54720617   10.11570326     3.87668593
```

```
## 139                 169      -13.32707129      -10.54720617        33.11570326
## 140                 121        4.87668593       -3.07707129        15.45279383
## 141                 400        5.06570307       10.87668593         5.92292871
## 142                   0       -4.64720607        6.11570326        -3.12331407
## 143                   1      -12.35707150       -0.54720617         9.11570326
## 144                   0        0.71668609       -4.07707129        -7.54720617
## 145                   4       -2.05429681        6.87668593         0.92292871
## 146                   4       -9.34720612        9.11570326        -3.12331407
## 147                   0      -15.07707129       -2.54720617        -2.88429674
## 148                  16       -0.62331407       -5.07707129        18.45279383
## 149                  25        5.66570345       10.87668593         2.92292871
## 150                 225      -10.40720606        7.11570326        28.87668593
## 151                   0      -14.69707118       -3.54720617        -0.88429674
## 152                   0       -1.37331407       -5.07707129        -1.54720617
## 153                   9       -0.36429676        7.87668593        13.92292871
## 154                  25       -6.04720617        6.11570326         2.87668593
## 155                   4      -13.97707139       -0.54720617        -3.88429674
## 156                  25        4.87668593       -3.07707129         5.45279383
## 157                   0        0.74570338       10.87668593       -14.07707129
## 158                   4       -2.54720617       10.11570326        -2.12331407
## 159                   1      -14.76707135       -3.54720617        -1.88429674
## 160                  16        1.75668605        0.92292871        -8.54720617
## 161                   0       -3.05429681        4.87668593       -16.07707129
## 162                   0       -9.41720605        4.11570326        -4.12331407
## 163                  25       -9.07707129        0.45279383        22.11570326
## 164                  16       -0.62331407       -5.07707129        34.45279383
## 165                   1        2.76570288       12.87668593        -4.07707129
## 166                  36      -10.54720617        7.11570326        -3.12331407
## 167                   4      -12.32707129       -0.54720617        42.11570326
## 168                  25        1.12668593       -4.07707129        -6.54720617
## 169                   0        0.11570326        7.87668593        -9.07707129
## 170                 441        2.83279395        7.11570326        19.87668593
## 171                  49       -2.49707137        5.45279383         7.11570326
## 172                   1        7.37668593       -5.07707129        -4.54720617
## 173                 100       -0.63429674        6.87668593         1.92292871
## 174                  16      -10.37720609        7.11570326        -4.12331407
## 175                  25       -9.93707142       -0.54720617        37.11570326
## 176                  81        1.09668572       -5.07707129         6.45279383
## 177                  25        3.11570326        6.87668593        -6.07707129
## 178                  16       -2.54720617        8.11570326        37.87668593
## 179                   9      -11.30707131       -2.54720617        38.11570326
## 180                 121       -1.12331407       -5.07707129         9.45279383
## 181                   4        2.86570326       10.87668593       -14.07707129
## 182                   4       -6.01720596       10.11570326        -2.12331407
## 183                 121       -9.47707139       -0.54720617        35.11570326
## 184                   0       -0.12331407       -3.07707129        -7.54720617
## 185                 121       -0.88429674        6.87668593        -3.07707129
## 186                 256        9.31279444        6.11570326        18.87668593
## 187                  64       -8.43707095       -0.54720617        22.11570326
## 188                  64       -1.82331411       -5.07707129        12.45279383
## 189                   0       -1.44429668        6.87668593       -14.07707129
## 190                   0       -7.99720597        6.11570326         5.87668593
## 191                  36      -13.57707129       -0.54720617         1.11570326
## 192                   4        1.12668593       -1.07707129        -3.54720617
```

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## 193          0   -2.03429683   10.87668593  -12.07707129
## 194          9   -6.36720634    8.11570326    3.87668593
## 195          0  -14.16707121   -1.54720617   -4.88429674
## 196          1    1.12668593   -1.07707129  -10.54720617
## 197          0    0.36570326    6.87668593   -4.07707129
## 198          4   -3.49720597    6.11570326    4.87668593
## 199          9   -7.07707129    4.45279383   -0.88429674
## 200         64    5.98668559   -5.07707129   17.45279383
## 201        361    0.99570338    6.87668593   13.92292871
## 202          4   -3.79720617   10.11570326   -4.12331407
## 203          0   -7.07707129   -4.54720617    3.11570326
## 204          0   -2.07331411   -5.07707129   -2.54720617
## 205          0   -2.88429674    6.87668593   20.92292871
## 206         36   -6.74720597    6.11570326   13.87668593
## 207          0  -12.97707139    3.45279383   -0.88429674
## 208          4    2.87668593   -5.07707129   13.45279383
## 209        144    0.26570336    6.87668593   17.92292871
## 210          0   -9.84720612    3.11570326   -3.12331407
## 211          4  -14.32707129    0.45279383   -4.88429674
## 212        100   -2.12331407   -1.07707129    6.45279383
## 213          4   -2.88429674    8.87668593  -14.07707129
## 214        576   -5.18720603    2.11570326   30.87668593
## 215        576   -9.57707129    1.45279383   23.11570326
## 216          4   -1.62331407   -4.07707129  -11.54720617
## 217          9    2.21570364    6.87668593   20.92292871
## 218          4   -8.79720617   12.11570326   -4.12331407
## 219          0  -13.82707129   -3.54720617   23.11570326
## 220        225    0.70668586   -9.07707129   23.45279383
## 221          0   -2.38429674    2.87668593  -13.07707129
## 222         16   -9.21720624    6.11570326   39.87668593
## 223          9  -13.07707129    1.45279383   16.11570326
## 224         16   -1.62331407   -5.07707129    7.45279383
## 225          0    0.36570326   10.87668593  -12.07707129
## 226          4   -9.59720612    2.11570326    9.87668593
## 227          4  -11.36707125    0.45279383    4.11570326
## 228          0   -2.12331407   -8.07707129   -9.54720617
## 229         49   16.97570387   10.87668593   -1.07707129
## 230          1   -3.54720617    6.11570326   32.87668593
## 231        676   -8.74707137    2.45279383   27.11570326
## 232          0   -2.12331407   -6.07707129  -10.54720617
## 233         25   -0.13429674    8.87668593  -11.07707129
## 234          9   -5.78720594    6.11570326   13.87668593
## 235          0   -7.07707129   -0.54720617   23.11570326
## 236          0   -2.12331407   -5.07707129  -10.54720617
## 237          1   -2.38429674   12.87668593  -14.07707129
## 238          0   -9.29720617    6.11570326   -1.12331407
## 239          1  -13.07707129   -0.54720617    4.11570326
## 240          0   -2.20331399   -5.07707129   -8.54720617
## 241        100   -2.82429679    6.87668593   -3.07707129
## 242         25   -9.34720612    6.11570326    9.87668593
## 243          0  -12.32707129   -0.54720617   13.11570326
## 244          0   -2.12331407   -3.07707129    4.45279383
## 245         49   12.27570311   10.87668593   11.92292871
## 246          0   -9.04720617    6.11570326   -3.12331407
```

```
## 247        0   -12.96707116     1.45279383     -0.88429674
## 248        9    -3.16331403    -6.07707129     25.45279383
## 249        0    -1.59429677     6.87668593    -14.07707129
## 250        0    -9.54720617     4.11570326     41.87668593
## 251       36   -10.62707148    -0.54720617      1.11570326
## 252      169     0.07668574   -11.07707129     34.45279383
## 253        4    -1.38429674     7.87668593      5.92292871
## 254        9    -8.66720605     6.11570326      6.87668593
## 255        0   -13.62707124    -2.54720617      5.11570326
## 256      529     5.78668578    -5.07707129     12.45279383
## 257        0    -1.78429683     8.87668593    -11.07707129
## 258        1    -9.54720617     7.11570326     -2.12331407
## 259       49   -11.17707120    -0.54720617      8.11570326
## 260        0    12.87668593     0.92292871      0.45279383
## 261        0    -1.88429674     6.87668593     -8.07707129
## 262        0    -9.54720617     6.11570326     -4.12331407
## 263        0   -13.52707134    -0.54720617      0.11570326
## 264        1    -2.12331407    -5.07707129     -1.54720617
## 265     1936     2.86570326     6.87668593     29.92292871
## 266       36    -9.64720607     2.11570326     43.87668593
## 267      289   -10.81707106     0.45279383     31.11570326
## 268        0    -1.62331407    -4.07707129    -10.54720617
## 269        0    -1.28429683     8.87668593    -10.07707129
## 270       64    -6.54720617     6.11570326     16.87668593
## 271        0   -14.18707119    -2.54720617      2.11570326
## 272        1     0.45668586    -1.07707129    -11.54720617
## 273       36    -1.88429674     6.87668593     25.92292871
## 274        4    -6.54720617    10.11570326     -3.12331407
## 275        1   -12.57707129    -0.54720617     -3.88429674
## 276        9    -2.20331399    -3.07707129    -11.54720617
## 277        0    -1.55429681    12.87668593    -16.07707129
## 278      400     6.34279322    11.11570326     20.87668593
## 279        1   -12.79707108     0.45279383     -4.88429674
## 280       49    -0.55331389    -3.07707129     24.45279383
## 281       16     0.36570326     9.87668593     -5.07707129
## 282      529    -9.59720612     8.11570326     35.87668593
## 283        1    -8.32707129    -0.54720617     18.11570326
## 284      676     3.37668593    -9.07707129     25.45279383
## 285        0    -2.13429674     6.87668593      0.92292871
## 286        1    -9.39720607     6.11570326     20.87668593
## 287        4   -12.07707129    -4.54720617     39.11570326
## 288        0     1.33668597    -5.07707129     14.45279383
## 289        0    -3.88429674     3.87668593    -15.07707129
## 290       64    -7.75720620     6.11570326     35.87668593
## 291       16   -11.29707108     3.45279383      5.11570326
## 292        0    -1.94331400    -5.07707129     -7.54720617
## 293        1    -1.20429691    10.87668593    -14.07707129
## 294        4    -8.44720626     6.11570326     -2.12331407
## 295        0   -14.16707121    -0.54720617     -1.88429674
## 296      169     0.87668593    -4.07707129      8.45279383
## 297      676    -2.28429683     4.87668593     16.92292871
## 298       36    -8.59720612     0.11570326     43.87668593
## 299       25   -10.07707129    -0.54720617      0.11570326
## 300       81    -2.12331407    -5.07707129     13.45279383
```

```
## 301          0     0.19570319    10.87668593    -8.07707129
## 302         81    -3.91720605     6.11570326    17.87668593
## 303          4   -14.07707129    -4.54720617    27.11570326
## 304          4    -1.37331407    -5.07707129    -7.54720617
## 305         49    -2.98429664     0.87668593    31.92292871
## 306          0    -9.54720617    -1.88429674    42.87668593
## 307        961   -10.82707129    -1.54720617    29.11570326
## 308          4    -1.62331407    -6.07707129    10.45279383
## 309          1    -2.88429674     1.87668593     8.92292871
## 310          0    -9.30720616     6.11570326    10.87668593
## 311          9    -9.05707083     5.45279383    17.11570326
## 312         64    -1.79331414    -5.07707129    23.45279383
## 313          0    -0.63429674    10.87668593   -13.07707129
## 314          0    -6.29720617     6.11570326     4.87668593
## 315          4   -13.57707129     1.45279383    12.11570326
## 316          1    -2.17331402    -5.07707129    -9.54720617
## 317          0    -2.88429674     4.87668593   -10.07707129
## 318         49    -7.85720611     4.11570326     1.87668593
## 319          4   -13.34707127    -3.54720617    27.11570326
## 320        144    -1.12331407    -7.07707129    21.45279383
## 321          0    -1.88429674     6.87668593    -9.07707129
## 322          1    -9.64720607     6.11570326    11.87668593
## 323          0   -14.02707134    -0.54720617    -3.88429674
## 324          0    -0.07331387    -7.07707129    -7.54720617
## 325        256     8.06570307    10.87668593    23.92292871
## 326        784     5.61279368    10.11570326    29.87668593
## 327         16   -10.82707129     3.45279383     5.11570326
## 328          0     0.12668593    -5.07707129    -8.54720617
## 329          9    -1.09429677     6.87668593    -5.07707129
## 330          0    -9.19720626     1.11570326    29.87668593
## 331          0   -14.07707129    -4.54720617    27.11570326
## 332         36     3.30668624    -1.07707129    -4.54720617
## 333          0    -0.18429693    10.87668593   -15.07707129
## 334        100    -0.56720662    12.11570326     2.87668593
## 335          1   -13.57707129     0.45279383    23.11570326
## 336         25    -0.88331429    -7.07707129     1.45279383
## 337          9     1.11570326    10.87668593     8.92292871
## 338          9    -6.54720617     8.11570326     5.87668593
## 339          4    -4.85707102     3.45279383     4.11570326
## 340          0    -0.62331407    -5.07707129     0.45279383
## 341        400    -2.88429674     3.87668593     5.92292871
## 342          4    -9.64720607     5.11570326    -4.12331407
## 343        961    -2.07707129    -1.54720617    29.11570326
## 344          4    -1.12331407    -5.07707129    -7.54720617
## 345        121    -0.63429674     5.87668593    -4.07707129
## 346          9    -8.54720617     6.11570326    16.87668593
## 347         81   -13.77707134    -0.54720617    15.11570326
## 348          0    -0.07331387    -5.07707129     6.45279383
## 349          0    -2.30429681     6.87668593    -4.07707129
## 350         25    -7.54720617     8.11570326     9.87668593
## 351          0   -12.50707112     1.45279383    -2.88429674
## 352          4     7.37668593     0.92292871    -6.54720617
## 353         25    -2.43429669     6.87668593   -11.07707129
## 354          1    -7.91720605     6.11570326    10.87668593
```

```
## 355              4   -7.07707129    -0.54720617    25.11570326
## 356              0   -2.20331399    -6.07707129   -11.54720617
## 357              4   -1.37429651     6.87668593   -12.07707129
## 358              0   -6.04720617    11.11570326    -2.12331407
## 359              0   -9.57707129     3.45279383     5.11570326
## 360             49   -1.58331410    -4.07707129    -6.54720617
## 361              9   -1.68429693     7.87668593    -6.07707129
## 362              4   -9.03720618     6.11570326     1.87668593
## 363              0  -12.57707129     1.45279383    -0.88429674
## 364             16   -1.77331416    -3.07707129    -7.54720617
## 365              4   -2.97429665     5.87668593   -15.07707129
## 366             49   -7.29720617     4.11570326    38.87668593
## 367            625  -13.02707110    -4.54720617    38.11570326
## 368              0   -1.37331407    -3.07707129     0.45279383
## 369            225   -2.48429664     6.87668593     8.92292871
## 370              1   -9.54720617     4.11570326    -3.12331407
## 371              9  -10.78707133     4.45279383     4.11570326
## 372              0   -2.58331410    -8.07707129   -10.54720617
## 373              0   -1.38429674     6.87668593    17.92292871
## 374             25   -9.41720605     6.11570326     0.87668593
## 375              1  -10.71707116     1.45279383     2.11570326
## 376              0   -0.44331424    -1.07707129   -11.54720617
## 377            100    0.91570345     6.87668593    -3.07707129
## 378             36   -4.01720643     4.11570326     8.87668593
## 379            100  -12.90707121   -12.54720617    16.11570326
## 380             16   -1.37331407    -3.07707129    -4.54720617
## 381             16    5.21570364     9.87668593   -16.07707129
## 382             25   -9.28720618    10.11570326     9.87668593
## 383            144   -7.94707118    -0.54720617     8.11570326
## 384            100   -0.62331407    -6.07707129    24.45279383
## 385              1   -2.88429674     5.87668593   -16.07707129
## 386             16   -3.79720617     6.11570326    -1.12331407
## 387              0  -12.93707142     0.45279383    23.11570326
## 388             64   -2.25331418    -5.07707129    32.45279383
## 389              0   -2.53429683     7.87668593     4.92292871
## 390            100   -6.46720624    10.11570326    36.87668593
## 391              0  -14.07707129     2.45279383     3.11570326
## 392              0   -0.92331426    -1.07707129    -4.54720617
## 393            225   -0.28429683     9.87668593    13.92292871
## 394            576   -2.54720617     6.11570326    18.87668593
## 395             25   -4.57707129     5.45279383    10.11570326
## 396              0   -1.36331408   -11.07707129    -6.54720617
## 397              0   -2.78429683     0.87668593    -3.07707129
## 398            625   -8.25720620     6.11570326    41.87668593
## 399             25   -6.15707121    -0.54720617    28.11570326
## 400              4    2.37668593    -1.07707129    -6.54720617
## 401             16   -1.83429655     3.87668593   -10.07707129
## 402              4   -7.89720607     6.11570326    21.87668593
## 403             25  -12.07707129    -1.54720617    18.11570326
## 404              0   -2.22331397    -7.07707129     5.45279383
## 405              9    2.11570326     6.87668593    -5.07707129
## 406              9   -4.11720586     2.11570326    21.87668593
## 407              0  -14.15707121    -3.54720617    43.11570326
## 408              0    1.12668593    -0.07707129    -8.54720617
```

```
## 409            4     0.36570326   10.87668593     6.92292871
## 410            0    -7.43720603    5.11570326    -2.12331407
## 411            0   -13.07707129   -2.54720617    -3.88429674
## 412          121    -0.68331401   -9.07707129    16.45279383
## 413          441     0.99570338    7.87668593    16.92292871
## 414            9    -7.11720634    8.11570326     4.87668593
## 415            0   -14.07707129    0.45279383    -0.88429674
## 416            0    -2.22331397   -6.07707129   -10.54720617
## 417          441     0.36570326    1.87668593    21.92292871
## 418            4    -8.20720601   10.11570326    -0.12331407
## 419            4   -13.82707129   -0.54720617     8.11570326
## 420            4     2.13668616   -4.07707129    -4.54720617
## 421            1     0.46570317    8.87668593    -7.07707129
## 422            4    -6.91720605   10.11570326    -3.12331407
## 423            9    -8.32707129    1.45279383     3.11570326
## 424            0    -1.92331402   -6.07707129   -11.54720617
## 425            1    -2.88429674    2.87668593    27.92292871
## 426            9    -9.54720617    8.11570326    27.87668593
## 427          324    -4.57707129    4.45279383    15.11570326
## 428            0    -2.24331395   -7.07707129   -10.54720617
## 429            1    -2.53429683    6.87668593    -8.07707129
## 430            4    -6.04720617    6.11570326    27.87668593
## 431            4    -6.69707118    5.45279383    10.11570326
## 432            0    -0.62331407   -3.07707129    -2.54720617
## 433           64     4.11570326   12.87668593    -8.07707129
## 434            1    -8.73720622    6.11570326     2.87668593
## 435            1    -8.27707110    3.45279383     3.11570326
## 436            0     4.29668601   -3.07707129    10.45279383
## 437           64     0.44570319    6.87668593     5.92292871
## 438          324    -8.54720617    3.11570326    16.87668593
## 439            0   -14.17707120   -0.54720617    31.11570326
## 440           16    14.87668593   -5.07707129     9.45279383
## 441          625     5.36570326   11.87668593    10.92292871
## 442            0    -9.04720617    6.11570326     8.87668593
## 443           16   -11.07707129    2.45279383    13.11570326
## 444           81     9.25668605   -0.07707129    -2.54720617
## 445            0     0.47570340   10.87668593     7.92292871
## 446            0    -8.99720621    6.11570326    15.87668593
## 447            0   -14.07707129    2.45279383    26.11570326
## 448          100    -0.62331407   -1.07707129     8.45279383
## 449            0     0.74570338    6.87668593    18.92292871
## 450            4    -3.24720597    9.11570326    -3.12331407
## 451            0   -14.07707129   -0.54720617     5.11570326
## 452            4    -1.87331407   -5.07707129    27.45279383
## 453            1    -4.38429674    6.87668593    -6.07707129
## 454           49    -6.64720607    6.11570326     3.87668593
## 455           16    -9.07707129    3.45279383    17.11570326
## 456            0    -2.22331397   -6.07707129   -11.54720617
## 457          169    -2.59429677    8.87668593    12.92292871
## 458         1089    -6.04720617    8.11570326    35.87668593
## 459            0   -13.07707129    0.45279383     0.11570326
## 460            0     0.87668593   -3.07707129    -1.54720617
## 461          289    -1.80429681    6.87668593    25.92292871
## 462            4    -8.79720617    6.11570326    33.87668593
```

```
## 463          576  -14.02707134   -4.54720617    44.11570326
## 464          400   -1.62331407   -5.07707129    13.45279383
## 465          900   -2.96429666   -2.12331407    33.92292871
## 466           81   -8.04720617    5.11570326    -2.12331407
## 467            1  -13.72707139    2.45279383    -2.88429674
## 468           81    0.82668574   -6.07707129     2.45279383
## 469           36    2.11570326    6.87668593    -0.07707129
## 470            0   -9.54720617   -1.88429674    30.87668593
## 471           81  -12.07707129   -3.54720617    25.11570326
## 472           16    0.37668593   -5.07707129    -3.54720617
## 473          100   -3.23429664    6.87668593    24.92292871
## 474            0   -9.54720617    5.11570326    -2.12331407
## 475          196  -12.57707129   -0.54720617    31.11570326
## 476          484   12.37668593   -1.07707129    10.45279383
## 477           25    2.29570357    7.87668593     3.92292871
## 478          144   -3.45720601    9.11570326     5.87668593
## 479          169   -5.25707160    3.45279383    29.11570326
## 480            0   -1.87331407   -5.07707129    29.45279383
## 481            0   -1.38429674    6.87668593   -14.07707129
## 482            0   -8.04720617    6.11570326     7.87668593
## 483           49  -13.36707125   -3.54720617     8.11570326
## 484          121    1.37668593   -7.07707129     1.45279383
## 485            1   -2.98429664    6.87668593    21.92292871
## 486           64   -6.94720626    5.11570326     5.87668593
## 487            9  -14.84707127   -4.54720617    22.11570326
## 488            0   -0.12331407  -11.07707129     5.45279383
## 489            4    2.44570319   10.87668593   -11.07707129
## 490            1   -9.64720607    6.11570326    20.87668593
## 491           36  -10.82707129   -0.54720617    15.11570326
## 492            4   -0.57331387   -1.07707129    21.45279383
## 493            4   -2.60429677    6.87668593    -0.07707129
## 494            0  -10.24720621    4.11570326    -3.12331407
## 495            0  -13.77707134    0.45279383    -0.88429674
## 496            0   -1.97331397   -4.07707129   -11.54720617
## 497          900    6.61570326    8.87668593    22.92292871
## 498          441   -7.39720607   10.11570326    33.87668593
## 499            1  -13.94707118   -2.54720617    -4.88429674
## 500           25    2.12668593   -5.07707129     1.45279383
## 501            4   -2.98429664    6.87668593   -15.07707129
## 502            1  -10.79720617    5.11570326    -3.12331407
## 503            0  -14.18707119  -12.54720617    36.11570326
## 504            0   -2.22331397  -12.07707129    21.45279383
## 505            9   11.82570235   10.87668593    -7.07707129
## 506            9   -6.29720617   10.11570326    -1.12331407
## 507            0  -14.47707139   -3.54720617    -1.88429674
## 508            9    1.50668605   -2.07707129     8.45279383
## 509            9   -2.38429674    6.87668593    13.92292871
## 510          196   -6.04720617    6.11570326    14.87668593
## 511            1  -14.07707129   -0.54720617    30.11570326
## 512            0   -0.74331395   -4.07707129    -5.54720617
## 513            0    4.11570326    6.87668593    -2.07707129
## 514          289   -7.59720636    1.11570326    19.87668593
## 515            0   -8.07707129    4.45279383     1.11570326
## 516            0   -3.69331412   -5.07707129     4.45279383
```

```
## 517            1      -2.80429681       6.87668593      -14.07707129
## 518          121      -3.21720624       8.11570326        6.87668593
## 519           25      -9.57707129      -0.54720617       12.11570326
##     centralizado tenure estandarizado wage estandarizado educ
## 1           -12.54720617       -0.756136319         -0.5577147
## 2           -15.07707129       -0.718116247         -0.1972490
## 3            -5.12331407       -0.783293466         -0.5577147
## 4            22.11570326        0.031421736         -1.6391117
## 5           -10.54720617       -0.158678426         -0.1972490
## 6            -9.07707129        0.778244004          1.2446136
## 7             1.87668593        1.457173339          1.9655450
## 8            -2.88429674       -0.240149998         -0.1972490
## 9            -8.54720617       -0.620350452         -0.1972490
## 10            3.92292871        3.339165538          1.6050793
## 11           -3.12331407        0.099314669          1.2446136
## 12           -5.88429674        0.609869560          0.1632166
## 13          -12.54720617        0.783675563         -0.1972490
## 14          -14.07707129       -0.104364131         -0.1972490
## 15            9.87668593        4.430884033         -0.1972490
## 16           -5.88429674        3.108329461          1.2446136
## 17          -12.54720617        0.438779337         -0.1972490
## 18           -7.07707129        1.288798895          0.1632166
## 19           -5.12331407       -0.620350452         -0.1972490
## 20            0.11570326       -0.375935865         -0.1972490
## 21           -8.54720617        0.270404893         -0.1972490
## 22           -4.07707129        0.704919512         -0.1972490
## 23            3.87668593        0.121040387          1.2446136
## 24           -4.88429674       -1.454075657         -0.1972490
## 25           -4.54720617        0.031421736         -0.5577147
## 26          -14.07707129        0.998217223          1.2446136
## 27            4.87668593        0.514819479          1.2446136
## 28           -5.88429674        1.796638007          1.2446136
## 29          -12.54720617        1.796638007          0.8841480
## 30          -16.07707129       -0.715400533         -1.6391117
## 31           -0.12331407        1.932423874          0.5236823
## 32           -0.88429674       -0.375935865          0.5236823
## 33            3.45279383        1.030805800          0.1632166
## 34          -14.07707129       -0.240149998         -0.1972490
## 35           -5.12331407       -0.327053000         -0.1972490
## 36           -1.88429674       -0.438397369          1.2446136
## 37           -6.54720617        0.072157522         -0.1972490
## 38           -2.07707129       -0.644791884         -3.0809744
## 39           -2.12331407       -0.783293466          0.5236823
## 40           -5.88429674        0.099314669         -0.1972490
## 41          -12.54720617        0.522966559         -0.1972490
## 42          -12.07707129        1.117708672         -0.1972490
## 43           -5.12331407       -0.375935865          0.5236823
## 44            6.11570326       -0.511721732         -0.5577147
## 45           -8.54720617        0.134619026          0.1632166
## 46           -4.07707129        2.122524036          0.8841480
## 47           -5.12331407       -1.144483884         -0.9181804
## 48           -3.88429674       -0.802303469         -0.1972490
## 49          -10.54720617       -0.606771813          0.5236823
## 50          -16.07707129       -0.810450614         -0.1972490
```

```
## 51         -5.12331407     -1.155346743        -0.1972490
## 52         -3.88429674      0.737508348         1.2446136
## 53         -7.54720617     -0.240149998        -0.1972490
## 54        -10.07707129      0.031421736        -0.1972490
## 55         -5.12331407     -0.919079333        -0.1972490
## 56         -5.88429674     -0.715400533         0.8841480
## 57        -11.54720617     -0.674664747         1.2446136
## 58        -17.07707129      1.117708672        -1.6391117
## 59          2.87668593      4.276087710         1.9655450
## 60         -5.88429674     -0.408524442         1.2446136
## 61          7.45279383      1.582096347         0.1632166
## 62        -12.07707129      1.766765209         0.5236823
## 63          2.87668593      0.099314669        -0.9181804
## 64         -5.88429674     -0.590477525        -0.9181804
## 65         -9.54720617      0.514819479         0.5236823
## 66          5.92292871      3.827994452         0.5236823
## 67         -1.12331407      0.099314669         1.2446136
## 68         -2.88429674      1.117708672        -0.1972490
## 69         -7.54720617     -0.047334057         1.2446136
## 70        -15.07707129     -1.054865200        -0.1972490
## 71         -5.12331407     -0.047334057         1.2446136
## 72         -3.88429674      1.954149592         1.6050793
## 73         -4.54720617     -0.264591496        -0.1972490
## 74         16.92292871     -0.807734899        -0.1972490
## 75         -5.12331407     -0.579614666        -0.1972490
## 76         13.11570326      1.633694863         0.1632166
## 77        -12.54720617     -0.511721732        -0.1972490
## 78        -16.07707129     -0.756136319        -0.1972490
## 79          7.87668593      0.696772432        -0.1972490
## 80         -5.88429674      0.341013476         1.9655450
## 81         -7.54720617     -0.375935865        -1.2786460
## 82        -16.07707129     -0.335200079         1.2446136
## 83         -5.12331407     -0.810450614        -0.9181804
## 84         -0.88429674      0.213374818        -0.1972490
## 85        -10.54720617     -0.647507599        -0.1972490
## 86        -14.07707129     -0.712684818        -0.1972490
## 87         -5.12331407     -0.715400533        -0.1972490
## 88         -1.88429674      0.574565204        -0.1972490
## 89         11.45279383      1.076973015        -1.6391117
## 90        -10.07707129      0.438779337        -0.1972490
## 91          0.87668593      0.006980238        -0.1972490
## 92         33.11570326      1.595674986         0.5236823
## 93        -12.54720617     -0.783293466        -0.1972490
## 94        -17.07707129     -0.291748643        -0.1972490
## 95         -4.12331407      0.167207603        -0.1972490
## 96         -4.88429674     -0.511721732        -1.2786460
## 97        -12.54720617     -0.647507599         0.1632166
## 98          4.92292871      1.975875310        -0.1972490
## 99         -3.12331407     -0.443828799         0.5236823
## 100        -5.88429674     -0.647507599        -0.1972490
## 101        -6.54720617     -0.204845642         0.8841480
## 102       -17.07707129     -0.579614666        -0.1972490
## 103         6.87668593     -0.375935865        -0.1972490
## 104        -1.88429674      0.474083693        -0.1972490
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## 105      -5.54720617    2.475567341      0.5236823
## 106     -14.07707129    0.262257684      0.8841480
## 107       5.87668593    2.022042525     -0.1972490
## 108       4.11570326    0.213374818     -0.1972490
## 109     -12.54720617   -0.910932189     -0.1972490
## 110     -17.07707129    1.063394377      1.6050793
## 111       6.87668593   -0.682811956     -0.5577147
## 112      19.11570326    5.185853122      1.9655450
## 113      -9.54720617   -0.131521279     -0.1972490
## 114     -17.07707129    0.061294663      0.5236823
## 115      10.87668593   -0.457407437      0.5236823
## 116      -5.88429674   -0.579614666     -0.9181804
## 117     -12.54720617   -0.647507599      0.5236823
## 118     -15.07707129   -0.609487528     -0.1972490
## 119      -4.12331407   -0.566036092      0.8841480
## 120       6.11570326   -0.783293466     -1.6391117
## 121     -11.54720617   -0.240149998      1.2446136
## 122     -17.07707129   -0.340631509      0.5236823
## 123      -5.12331407   -0.783293466      0.8841480
## 124      -5.88429674   -0.728979106     -0.1972490
## 125      -9.54720617   -0.536163165      1.9655450
## 126     -14.07707129    0.148197535      1.2446136
## 127      -2.12331407   -0.109795561     -0.9181804
## 128      24.11570326   -1.190651067     -1.6391117
## 129     -10.54720617   -0.810450614     -0.9181804
## 130     -16.07707129   -0.240149998     -0.5577147
## 131      -2.12331407    0.824411220      1.9655450
## 132      -5.88429674   -0.240149998      0.8841480
## 133     -11.54720617   -0.642076170     -0.1972490
## 134     -17.07707129   -0.810450614     -0.5577147
## 135      -5.12331407   -0.375935865     -0.1972490
## 136      -5.88429674   -0.986972267     -0.1972490
## 137      -7.54720617   -0.240149998      0.5236823
## 138     -14.07707129    1.117708672      1.2446136
## 139       7.87668593   -0.579614666     -3.8019057
## 140       5.11570326    1.117708672      0.5236823
## 141       7.45279383    1.375701767      1.2446136
## 142     -17.07707129    0.547408056     -0.1972490
## 143      -4.12331407   -0.316190141     -0.1972490
## 144      -5.88429674   -0.012029700      0.1632166
## 145     -10.54720617   -0.557888948     -0.1972490
## 146     -15.07707129   -0.728979106      0.8841480
## 147      -5.12331407   -1.054865200     -0.9181804
## 148      -1.88429674   -0.375935865     -0.1972490
## 149      -7.54720617    1.538644911      1.2446136
## 150      -2.07707129   -1.016845129      0.1632166
## 151      -5.12331407   -0.951667910     -1.2786460
## 152      -5.88429674   -0.579614666     -0.1972490
## 153      -9.54720617   -0.098932702      0.1632166
## 154     -12.07707129    0.167207603     -0.1972490
## 155      -3.12331407   -0.756136319     -0.1972490
## 156      -0.88429674    1.117708672      0.5236823
## 157     -12.54720617    0.202511959      1.2446136
## 158     -15.07707129    1.117708672      1.2446136
```

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## 159         -4.12331407        -0.970677978          -1.2786460
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## 161        -12.54720617        -0.829460682          -0.9181804
## 162        -17.07707129        -0.747989110          -0.9181804
## 163         -0.12331407         0.574565204           0.1632166
## 164         -1.88429674        -0.375935865          -0.1972490
## 165        -11.54720617         0.751086727           1.9655450
## 166        -11.07707129        -1.054865200           0.1632166
## 167         -3.12331407        -0.308042932          -0.1972490
## 168         -0.88429674         0.099314669           0.1632166
## 169        -12.54720617         0.031421736           0.1632166
## 170          3.92292871         2.578764631           0.1632166
## 171          1.87668593         2.361507192           1.9655450
## 172         -4.88429674         1.796638007          -0.1972490
## 173         -2.54720617        -0.172257065          -0.1972490
## 174        -13.07707129        -1.008697985           0.1632166
## 175         -0.12331407         0.341013476          -0.1972490
## 176          3.11570326         0.091167460          -0.1972490
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## 181        -10.54720617         0.778244004           1.2446136
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## 183          5.87668593         0.465936484          -0.1972490
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## 185         -1.54720617        -0.240149998          -0.1972490
## 186         -1.07707129         4.338549602          -0.1972490
## 187          2.87668593         0.748371207          -0.1972490
## 188          2.11570326        -0.701821959          -0.1972490
## 189        -12.54720617        -0.392230154          -0.1972490
## 190        -17.07707129        -0.362357227          -0.1972490
## 191          0.87668593        -0.647507599          -0.1972490
## 192         -3.88429674         0.099314669           1.2446136
## 193        -12.54720617        -0.552457518           1.2446136
## 194        -14.07707129         0.080304601           0.5236823
## 195         -5.12331407        -0.807734899          -0.5577147
## 196         -4.88429674         0.099314669           1.2446136
## 197        -12.54720617         0.099314669          -0.1972490
## 198        -15.07707129         0.859715576          -0.1972490
## 199         -2.12331407         1.117708672           1.6050793
## 200          2.11570326         1.419153203          -0.1972490
## 201          6.45279383         0.270404893          -0.1972490
## 202        -15.07707129         0.778244004           1.2446136
## 203         -5.12331407         1.117708672          -1.6391117
## 204         -5.88429674        -0.769714892          -0.1972490
## 205        -12.54720617        -0.783293466          -0.1972490
## 206        -11.07707129        -0.022892559          -0.1972490
## 207         -5.12331407        -0.484564585           1.2446136
## 208         -3.88429674         0.574565204          -0.1972490
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## 210        -17.07707129        -0.864764973          -1.2786460
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## 212          4.11570326        -0.783293466           1.2446136
```

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## 213         -10.54720617       -0.783293466            0.5236823
## 214           6.92292871        0.400759330           -1.6391117
## 215          18.87668593        0.438779337            0.5236823
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## 217          -9.54720617        0.601722481           -0.1972490
## 218         -15.07707129       -0.579614666            1.9655450
## 219          -5.12331407       -0.715400533           -1.2786460
## 220           9.11570326       -0.014745480           -1.6391117
## 221         -12.54720617       -0.647507599           -1.6391117
## 222         -13.07707129       -0.693674815           -0.1972490
## 223          -2.12331407       -0.511721732            0.5236823
## 224          -1.88429674       -0.647507599           -0.1972490
## 225         -12.54720617        0.099314669            1.2446136
## 226         -15.07707129       -0.796872040           -1.6391117
## 227          -3.12331407       -0.047334057            0.1632166
## 228          -5.88429674       -0.783293466           -1.2786460
## 229          -5.54720617        4.610121336            1.2446136
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## 231          20.87668593        0.664183855            0.8841480
## 232          -5.88429674       -0.783293466           -0.5577147
## 233          -7.54720617       -0.036471198            0.5236823
## 234         -14.07707129        0.237816316           -0.1972490
## 235          -5.12331407        1.117708672           -0.1972490
## 236          -5.88429674       -0.783293466           -0.1972490
## 237         -11.54720617       -0.647507599            1.9655450
## 238         -17.07707129       -0.715400533           -0.1972490
## 239          -4.12331407       -0.511721732           -0.1972490
## 240          -5.88429674       -0.805019184           -0.1972490
## 241          -2.54720617       -0.766999178           -0.1972490
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## 245          -5.54720617        3.333733979            1.2446136
## 246         -17.07707129       -0.647507599           -0.1972490
## 247          -5.12331407       -0.481848805            0.5236823
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## 249         -12.54720617       -0.432965940           -0.1972490
## 250         -17.07707129       -0.783293466           -0.9181804
## 251           0.87668593        0.153628964           -0.1972490
## 252           7.11570326       -0.185835703           -2.3600430
## 253         -10.54720617       -0.375935865            0.1632166
## 254         -14.07707129       -0.544310309           -0.1972490
## 255          -5.12331407       -0.661086173           -0.9181804
## 256          17.11570326        1.364838908           -0.1972490
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## 263          -5.12331407       -0.633929025           -0.1972490
## 264          -4.88429674       -0.783293466           -0.1972490
## 265          31.45279383        0.778244004           -0.1972490
## 266         -11.07707129       -0.810450614           -1.6391117
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## 267          11.87668593        0.102030449          0.1632166
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## 270          -9.07707129        0.031421736         -0.1972490
## 271          -5.12331407       -0.813166328         -0.9181804
## 272          -4.88429674       -0.082638413          1.2446136
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## 274         -15.07707129        0.031421736          1.2446136
## 275          -4.12331407       -0.375935865         -0.1972490
## 276          -2.88429674       -0.805019184          0.5236823
## 277         -12.54720617       -0.422103081          1.9655450
## 278           2.92292871        3.531981221          1.6050793
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## 281          -8.54720617        0.099314669          0.8841480
## 282           5.92292871       -0.796872040          0.5236823
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## 289         -12.54720617       -1.054865200         -1.2786460
## 290          -9.07707129       -0.297180073         -0.1972490
## 291          -1.12331407       -0.028323989          1.2446136
## 292          -5.88429674       -0.734410536         -0.1972490
## 293         -11.54720617       -0.327053000          1.2446136
## 294         -15.07707129       -0.484564585         -0.1972490
## 295          -5.12331407       -0.807734899         -0.1972490
## 296           7.11570326        0.031421736          0.1632166
## 297          13.45279383       -0.620350452         -0.9181804
## 298         -11.07707129       -0.525300306         -2.3600430
## 299          -0.12331407        0.302993470         -0.1972490
## 300           3.11570326       -0.783293466         -0.1972490
## 301         -12.54720617        0.053147454          1.2446136
## 302          -8.07707129        0.745655427         -0.1972490
## 303          -3.12331407       -0.783293466         -1.6391117
## 304          -3.88429674       -0.579614666         -0.1972490
## 305          -5.54720617       -0.810450614         -2.3600430
## 306         -17.07707129       -0.783293466         -3.0809744
## 307          25.87668593        0.099314669         -0.5577147
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## 315          -3.12331407       -0.647507599          0.5236823
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## 320           6.11570326       -0.511721732         -0.9181804
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## 321        -12.54720617     -0.511721732      -0.1972490
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## 339         -3.12331407      1.720597994       1.2446136
## 340         -5.88429674     -0.375935865      -0.1972490
## 341          7.45279383     -0.783293466      -1.2786460
## 342        -15.07707129     -0.810450614      -0.5577147
## 343         25.87668593      2.475567341      -0.5577147
## 344         -3.88429674     -0.511721732      -0.1972490
## 345         -1.54720617     -0.172257065      -0.5577147
## 346        -14.07707129     -0.511721732      -0.1972490
## 347          3.87668593     -0.701821959      -0.1972490
## 348         -5.88429674     -0.226571360      -0.1972490
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## 357        -10.54720617     -0.373220086      -0.1972490
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## 359         -5.12331407      0.438779337       1.2446136
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## 363         -5.12331407     -0.375935865       0.5236823
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## 365        -10.54720617     -0.807734899      -0.5577147
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## 368         -5.88429674     -0.579614666       0.5236823
## 369          2.45279383     -0.674664747      -0.1972490
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## 372         -5.88429674     -0.908216474      -1.2786460
## 373        -12.54720617     -0.375935865      -0.1972490
## 374        -12.07707129     -0.747989110      -0.1972490
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## 385         -11.54720617       -0.783293466         -0.5577147
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## 388           2.11570326       -0.818597823         -0.1972490
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## 401          -8.54720617       -0.498143094         -1.2786460
## 402         -15.07707129       -0.335200079         -0.1972490
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## 408          -5.88429674        0.099314669          1.6050793
## 409         -10.54720617        0.099314669          1.2446136
## 410         -17.07707129       -0.210277071         -0.5577147
## 411          -5.12331407       -0.511721732         -0.9181804
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## 416          -5.88429674       -0.810450614         -0.5577147
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## 482        -17.07707129      -0.375935865      -0.1972490
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## 494        -17.07707129       -0.973393693         -0.9181804
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## 496         -5.88429674       -0.742557680          0.1632166
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##     estandarizado exper estandarizado tenure
## 1          -1.113080460          -0.70782529
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## 3          -1.113080460          -0.70782529
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## 6          -0.596298184           0.39743631
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## 9           0.658744487          -0.15519449
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## 11         -0.670124223          -0.43150989
## 12         -1.039254421          -0.70782529
## 13         -0.153341947          -0.70782529
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## 15          1.027874684           1.36454022
## 16         -0.227167987          -0.70782529
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## 21          -0.448646105          -0.15519449
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## 23          -0.596298184           0.53559402
## 24          -1.039254421          -0.56966759
## 25           1.470830921           0.39743631
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## 27          -0.448646105           0.67375172
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## 236        -1.113080460         -0.70782529
## 237        -1.039254421         -0.56966759
## 238        -0.965428381         -0.70782529
## 239        -0.522472144         -0.56966759
## 240        -0.965428381         -0.70782529
## 241        -0.227167987          0.67375172
## 242        -0.153341947         -0.01703679
## 243         0.141962211         -0.70782529
## 244        -0.005689868         -0.70782529
## 245         0.880222606          0.25927861
## 246        -1.113080460         -0.70782529
## 247        -0.891602342         -0.70782529
## 248         1.544656961         -0.29335219
## 249        -1.039254421         -0.70782529
## 250         2.209091316         -0.70782529
## 251        -0.743950263          0.12112091
## 252         2.209091316          1.08822482
## 253         0.437266369         -0.43150989
## 254        -0.374820066         -0.29335219
## 255        -0.448646105         -0.70782529
## 256         0.584918448          2.46980183
## 257        -0.817776302         -0.70782529
## 258        -1.039254421         -0.56966759
## 259        -0.227167987          0.25927861
## 260        -0.300994026         -0.70782529
## 261        -0.596298184         -0.70782529
## 262        -1.186906500         -0.70782529
## 263        -0.817776302         -0.70782529
## 264        -0.448646105         -0.56966759
## 265         2.209091316          5.37111355
## 266         2.356743395          0.12112091
## 267         1.470830921          1.64085562
## 268        -1.113080460         -0.70782529
## 269        -0.743950263         -0.70782529
## 270         0.363440329          0.39743631
## 271        -0.670124223         -0.70782529
## 272        -1.186906500         -0.56966759
## 273         1.913787158          0.12112091
## 274        -1.113080460         -0.43150989
## 275        -1.113080460         -0.56966759
## 276        -1.186906500         -0.29335219
## 277        -1.186906500         -0.70782529
## 278         0.658744487          2.05532873
## 279        -1.186906500         -0.56966759
## 280         1.470830921          0.25927861
## 281        -0.374820066         -0.15519449
## 282         1.766135079          2.46980183
## 283         0.511092408         -0.56966759
## 284         1.544656961          2.88427493
## 285         0.068136171         -0.70782529
## 286         0.658744487         -0.56966759
```

```
## 287          2.061439237          -0.43150989
## 288          0.732570527          -0.70782529
## 289         -1.113080460          -0.70782529
## 290          1.766135079           0.39743631
## 291         -0.448646105          -0.15519449
## 292         -0.891602342          -0.70782529
## 293         -1.039254421          -0.56966759
## 294         -1.039254421          -0.43150989
## 295         -0.965428381          -0.70782529
## 296          0.289614290           1.08822482
## 297          1.249352803           2.88427493
## 298          2.356743395           0.12112091
## 299         -0.817776302          -0.01703679
## 300          0.658744487           0.53559402
## 301         -0.596298184          -0.70782529
## 302          0.437266369           0.53559402
## 303          1.175526763          -0.43150989
## 304         -0.891602342          -0.43150989
## 305          2.356743395           0.25927861
## 306          2.282917356          -0.70782529
## 307          1.323178842           3.57506344
## 308          0.437266369          -0.43150989
## 309          0.658744487          -0.56966759
## 310         -0.079515908          -0.70782529
## 311          0.437266369          -0.29335219
## 312          1.397004882           0.39743631
## 313         -0.965428381          -0.70782529
## 314         -0.522472144          -0.70782529
## 315          0.068136171          -0.43150989
## 316         -1.039254421          -0.56966759
## 317         -0.743950263          -0.70782529
## 318         -0.743950263           0.25927861
## 319          1.175526763          -0.43150989
## 320          1.249352803           0.95006712
## 321         -0.670124223          -0.70782529
## 322         -0.005689868          -0.56966759
## 323         -1.113080460          -0.70782529
## 324         -0.891602342          -0.70782529
## 325          1.766135079           1.50269792
## 326          1.323178842           3.16059033
## 327         -0.448646105          -0.15519449
## 328         -0.965428381          -0.70782529
## 329         -0.374820066          -0.29335219
## 330          1.323178842          -0.70782529
## 331          1.175526763          -0.70782529
## 332         -0.670124223           0.12112091
## 333         -1.113080460          -0.70782529
## 334         -0.670124223           0.67375172
## 335          0.880222606          -0.56966759
## 336         -0.227167987          -0.01703679
## 337          0.658744487          -0.29335219
## 338         -0.448646105          -0.29335219
## 339         -0.522472144          -0.43150989
## 340         -0.300994026          -0.70782529
```

```
## 341        0.437266369         2.05532873
## 342       -1.186906500        -0.43150989
## 343        1.323178842         3.57506344
## 344       -0.891602342        -0.43150989
## 345       -0.300994026         0.81190942
## 346        0.363440329        -0.29335219
## 347        0.289614290         0.53559402
## 348        0.141962211        -0.70782529
## 349       -0.300994026        -0.70782529
## 350       -0.153341947        -0.01703679
## 351       -1.039254421        -0.70782529
## 352       -0.817776302        -0.43150989
## 353       -0.817776302        -0.01703679
## 354       -0.079515908        -0.56966759
## 355        1.027874684        -0.43150989
## 356       -1.186906500        -0.70782529
## 357       -0.891602342        -0.43150989
## 358       -1.039254421        -0.70782529
## 359       -0.448646105        -0.70782529
## 360       -0.817776302         0.25927861
## 361       -0.448646105        -0.29335219
## 362       -0.743950263        -0.43150989
## 363       -0.891602342        -0.70782529
## 364       -0.891602342        -0.15519449
## 365       -1.113080460        -0.43150989
## 366        1.987613198         0.25927861
## 367        1.987613198         2.74611723
## 368       -0.300994026        -0.70782529
## 369        0.658744487         1.36454022
## 370       -1.113080460        -0.56966759
## 371       -0.522472144        -0.29335219
## 372       -1.113080460        -0.70782529
## 373        1.323178842        -0.70782529
## 374       -0.817776302        -0.01703679
## 375       -0.670124223        -0.56966759
## 376       -1.186906500        -0.70782529
## 377       -0.227167987         0.67375172
## 378       -0.227167987         0.12112091
## 379        0.363440329         0.67375172
## 380       -0.670124223        -0.15519449
## 381       -1.186906500        -0.15519449
## 382       -0.153341947        -0.01703679
## 383       -0.227167987         0.95006712
## 384        1.470830921         0.67375172
## 385       -1.186906500        -0.56966759
## 386       -0.965428381        -0.15519449
## 387        0.880222606        -0.70782529
## 388        2.061439237         0.39743631
## 389        0.363440329        -0.70782529
## 390        1.839961119         0.67375172
## 391       -0.596298184        -0.70782529
## 392       -0.670124223        -0.70782529
## 393        1.027874684         1.36454022
## 394        0.511092408         2.60795953
```

```
## 395         -0.079515908           -0.01703679
## 396         -0.817776302           -0.70782529
## 397         -0.227167987           -0.70782529
## 398          2.209091316            2.74611723
## 399          1.249352803           -0.01703679
## 400         -0.817776302           -0.43150989
## 401         -0.743950263           -0.15519449
## 402          0.732570527           -0.43150989
## 403          0.511092408           -0.01703679
## 404          0.068136171           -0.70782529
## 405         -0.374820066           -0.29335219
## 406          0.732570527           -0.29335219
## 407          2.356743395           -0.70782529
## 408         -0.965428381           -0.70782529
## 409          0.511092408           -0.43150989
## 410         -1.039254421           -0.70782529
## 411         -1.113080460           -0.70782529
## 412          0.880222606            0.81190942
## 413          1.249352803            2.19348643
## 414         -0.522472144           -0.29335219
## 415         -0.891602342           -0.70782529
## 416         -1.113080460           -0.70782529
## 417          1.618483000            2.19348643
## 418         -0.891602342           -0.43150989
## 419         -0.227167987           -0.43150989
## 420         -0.670124223           -0.43150989
## 421         -0.522472144           -0.56966759
## 422         -1.113080460           -0.43150989
## 423         -0.596298184           -0.29335219
## 424         -1.186906500           -0.70782529
## 425          2.061439237           -0.56966759
## 426          1.175526763           -0.29335219
## 427          0.289614290            1.77901332
## 428         -1.113080460           -0.70782529
## 429         -0.596298184           -0.56966759
## 430          1.175526763           -0.43150989
## 431         -0.079515908           -0.43150989
## 432         -0.522472144           -0.70782529
## 433         -0.596298184            0.39743631
## 434         -0.670124223           -0.56966759
## 435         -0.596298184           -0.56966759
## 436          0.437266369           -0.70782529
## 437          0.437266369            0.39743631
## 438          0.363440329            1.77901332
## 439          1.470830921           -0.70782529
## 440          0.363440329           -0.15519449
## 441          0.806396566            2.74611723
## 442         -0.227167987           -0.70782529
## 443          0.141962211           -0.15519449
## 444         -0.522472144            0.53559402
## 445          0.584918448           -0.70782529
## 446          0.289614290           -0.70782529
## 447          1.101700724           -0.70782529
## 448          0.289614290            0.67375172
```

```
## 449          1.397004882           -0.70782529
## 450         -1.113080460           -0.43150989
## 451         -0.448646105           -0.70782529
## 452          1.692309040           -0.43150989
## 453         -0.448646105           -0.56966759
## 454         -0.596298184            0.25927861
## 455          0.437266369           -0.15519449
## 456         -1.186906500           -0.70782529
## 457          0.954048645            1.08822482
## 458          1.766135079            3.85137884
## 459         -0.817776302           -0.70782529
## 460         -0.448646105           -0.70782529
## 461          1.913787158            1.64085562
## 462          1.618483000           -0.43150989
## 463          2.430569434            2.60795953
## 464          0.658744487            2.05532873
## 465          2.504395474            3.43690573
## 466         -1.039254421            0.53559402
## 467         -1.039254421           -0.56966759
## 468         -0.153341947            0.53559402
## 469         -0.005689868            0.12112091
## 470          1.397004882           -0.70782529
## 471          1.027874684            0.53559402
## 472         -0.596298184           -0.15519449
## 473          1.839961119            0.67375172
## 474         -1.039254421           -0.70782529
## 475          1.470830921            1.22638252
## 476          0.437266369            2.33164413
## 477          0.289614290           -0.01703679
## 478         -0.448646105            0.95006712
## 479          1.323178842            1.08822482
## 480          1.839961119           -0.70782529
## 481         -1.039254421           -0.70782529
## 482         -0.300994026           -0.70782529
## 483         -0.227167987            0.25927861
## 484         -0.227167987            0.81190942
## 485          1.618483000           -0.56966759
## 486         -0.448646105            0.39743631
## 487          0.806396566           -0.29335219
## 488          0.068136171           -0.70782529
## 489         -0.817776302           -0.43150989
## 490          0.658744487           -0.56966759
## 491          0.289614290            0.12112091
## 492          1.249352803           -0.43150989
## 493         -0.005689868           -0.43150989
## 494         -1.113080460           -0.70782529
## 495         -0.891602342           -0.70782529
## 496         -1.186906500           -0.70782529
## 497          1.692309040            3.43690573
## 498          1.618483000            2.19348643
## 499         -1.186906500           -0.56966759
## 500         -0.227167987           -0.01703679
## 501         -1.113080460           -0.43150989
## 502         -1.113080460           -0.56966759
```

```
## 503         1.839961119          -0.70782529
## 504         1.249352803          -0.70782529
## 505        -0.522472144          -0.29335219
## 506        -0.965428381          -0.29335219
## 507        -0.965428381          -0.70782529
## 508         0.289614290          -0.29335219
## 509         1.027874684          -0.29335219
## 510         0.215788250           1.22638252
## 511         1.397004882          -0.56966759
## 512        -0.743950263          -0.70782529
## 513        -0.153341947          -0.70782529
## 514         0.584918448           1.64085562
## 515        -0.743950263          -0.70782529
## 516        -0.005689868          -0.70782529
## 517        -1.039254421          -0.56966759
## 518        -0.374820066           0.81190942
## 519         0.068136171          -0.01703679
```

Ejercicio 5

```
library(readr)
```

Cargue en memoria el archivo "netflix.csv" y asignelo a una variable

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

```
netflix <- read_csv("~/ITBA MARIA/3 1Q/Analitica Descriptiva/examen1_2s2023/netflix.csv")
```

```
## Rows: 542 Columns: 5
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (2): names, maturity_rating
## dbl (3): release_year, hours, minutes
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
View(netflix)
```

```
netflix<-netflix %>% mutate(duracion_minutos=netflix$hours*60)
View(netflix)
```

a) Cree una columna que indique la duracion total en minutos (hours*60+minutes)

```
library(dplyr)
#Anio con mayor duracion promedio

anio_duracion_promedio_mas_alta<-netflix %>% group_by(release_year) %>% summarise(duracion_promedio=mean

#Anio con mayor variabilidad
netflix %>% group_by(release_year) %>% summarise(variabilidad=sd(duracion_minutos,na.rm=T)) %>% arrange
```

b) ¿Cual es el año con mayor duracion promedio? [obtener duracion total promedio con la columna anterior, agrupar por año, calcular la duracion promedio, y ordenar de mayor a menor] ¿cual es el año con mayor variabilidad? [sd(x) calcula el desvio estandar del vector x]Sobre la duración

```
## # A tibble: 1 x 2
##   release_year variabilidad
##          <dbl>        <dbl>
## 1         2001         69.3
```

c) De las peliculas para mayores de 13 anios (maturity U/A 13+), el año de la duracion promedio mas alta, es igual a la poblacion general? [operacion anterior + filtro] (Asumo que solo es las peliculas mayores a 13 anios, no las mayores a 16 o A o U)

```
anio_duracion_promedio_mas_alta_filtrado<-netflix %>% filter(maturity_rating== "U/A 13+") %>% group_by(r

anio_duracion_promedio_mas_alta[1]==anio_duracion_promedio_mas_alta_filtrado[1]
```

```
##      release_year
## [1,]        FALSE
```

Ejercicio 6 - GGPLOT

```
library(ggplot2)
```

a) Utilizando GGPLOT, realice un gráfico que permita visualizar la distribución de la duracion calculada en el punto (5.b) por cada "maturity_rating" (puede ser boxplot, histograma, densidad, o el que sea relevante)

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

```
ggplot(netflix, aes(x = duracion_minutos, fill = maturity_rating)) +
  geom_density(alpha = 0.4) +
  labs(title = "Grafico de Densidad de Duracion por Maturity Rating",
       x = "Duracion en minutos)",
       y = "Densidad")
```

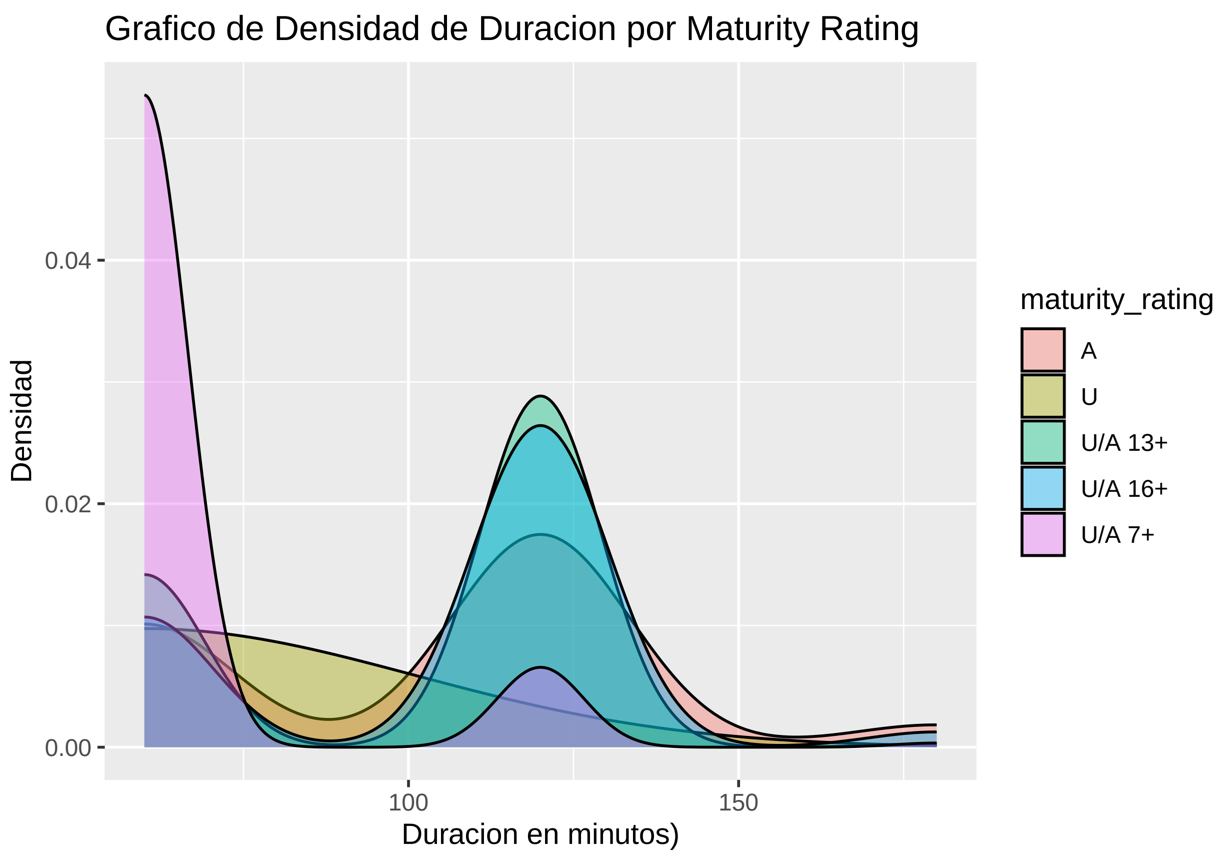
Grafico de Densidad de Duracion por Maturity Rating
0.04
0.02
0.00
Densidad
100
150
Duracion en minutos)
maturity_rating
A
U
U/A 13+
U/A 16+
U/A 7+