ESCUELA POLITECNICA NACIONAL

INGENIERIA EN CIENCIAS DE LA COMPUTACION

Data Mining y Machine Learning

2 Hands On: Data Quality and Pre-Processing

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1. Assessing Data Quality

Load the following packages: dplyr, na.tools, tidyimpute (version from github decisionpatterns/tidyimpute")

Load the carInsurance data set about the insurance risk rating of cars based on several characteristics of each car1

sdfsdfsdfsdfsdf Prueba

(a) Check if there are any missing values. (Compruebe si faltan valores)

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.3.1
```

```
##
## 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
```

```
library(na.tools)
library(tidyimpute)
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.3.1
```

```
## Warning: package 'ggplot2' was built under R version 4.3.1
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v forcats   1.0.0     v readr     2.1.4
## v ggplot2   3.4.2     v stringr   1.5.0
## v lubridate 1.9.2     v tibble    3.2.1
## v purrr     1.0.1     v tidyr     1.3.0
```

```
## -- Conflicts ---------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
# Carga el archivo .Rdata
df <- load("R:\\Politecnica.Nacional\\2023-A\\Data Mining\\Deberes.Data\\carInsurance.Rdata")

# Obtiene y verifica los objetos cargados en el entorno
#ls()
carIns
```

```
## # A tibble: 205 x 26
##     symb normLoss make        fuelType aspiration nDoors bodyStyle   driveWheels
##    <int>    <int> <fct>       <fct>    <fct>      <fct>  <fct>       <fct>
##  1     3       NA alfa-romero gas      std        two    convertible rwd
##  2     3       NA alfa-romero gas      std        two    convertible rwd
##  3     1       NA alfa-romero gas      std        two    hatchback   rwd
##  4     2      164 audi        gas      std        four   sedan       fwd
##  5     2      164 audi        gas      std        four   sedan       4wd
##  6     2       NA audi        gas      std        two    sedan       fwd
##  7     1      158 audi        gas      std        four   sedan       fwd
##  8     1       NA audi        gas      std        four   wagon       fwd
##  9     1      158 audi        gas      turbo      four   sedan       fwd
## 10     0       NA audi        gas      turbo      two    hatchback   4wd
## # i 195 more rows
## # i 18 more variables: engineLocation <fct>, wheelBase <dbl>, length <dbl>,
## #   width <dbl>, height <dbl>, curbWeight <int>, engineType <fct>,
## #   nrCylinds <fct>, engineSize <int>, fuelSystem <fct>, bore <dbl>,
## #   stroke <dbl>, compressionRatio <dbl>, horsePower <int>, peakRpm <int>,
## #   cityMpg <int>, highwayMpg <int>, price <int>
```

```
# Verifica si hay valores faltantes
if(any_na(carIns)){
  print("Existe valores faltantes en el objeto 'carIns'")
} else{
  print("No esxiste valores faltantes en el objeto 'carIns")
}
```

```
## [1] "Existe valores faltantes en el objeto 'carIns'"
```

(b) Cuente el número de casos que tienen, al menos, un valor faltante.

```
# Filtrar los casos con al menos un valor faltante
casosFaltantes <- carIns %>% filter_any_na()

# Numero de casos con numeros faltantes
numCasosFaltantes <- casosFaltantes %>% count()

# Imprime el numero de casos faltantes
print(numCasosFaltantes)
```

```
## # A tibble: 1 x 1
##       n
##   <int>
## 1   159
```

(c) Cree un nuevo conjunto de datos eliminando todos los casos que tengan valores faltantes.

```
# Crea un nuevo conjunto de datos eliminando las filas que con valores faltantes
nuevo_df <- drop_rows_any_na(carIns)

print(nuevo_df)
```

```
## # A tibble: 159 x 26
##     symb normLoss make      fuelType aspiration nDoors bodyStyle driveWheels
##    <int>    <int> <fct>     <fct>    <fct>      <fct>  <fct>     <fct>
##  1     2      164 audi      gas      std        four   sedan     fwd
##  2     2      164 audi      gas      std        four   sedan     4wd
##  3     1      158 audi      gas      std        four   sedan     fwd
##  4     1      158 audi      gas      turbo      four   sedan     fwd
##  5     2      192 bmw       gas      std        two    sedan     rwd
##  6     0      192 bmw       gas      std        four   sedan     rwd
##  7     0      188 bmw       gas      std        two    sedan     rwd
##  8     0      188 bmw       gas      std        four   sedan     rwd
##  9     2      121 chevrolet gas      std        two    hatchback fwd
## 10     1       98 chevrolet gas      std        two    hatchback fwd
## # i 149 more rows
## # i 18 more variables: engineLocation <fct>, wheelBase <dbl>, length <dbl>,
## #   width <dbl>, height <dbl>, curbWeight <int>, engineType <fct>,
## #   nrCylinds <fct>, engineSize <int>, fuelSystem <fct>, bore <dbl>,
## #   stroke <dbl>, compressionRatio <dbl>, horsePower <int>, peakRpm <int>,
## #   cityMpg <int>, highwayMpg <int>, price <int>
```

(d) Cree un nuevo conjunto de datos ingresando todos los valores faltantes con 0. Consejo: explore las variantes de la función impute()

```
# Convertir el objeto en un dataframe
df <- as.data.frame(carIns)

# Recorrer las columnas del dataframe
for (col in names(df)) {
  # Reemplazar los valores faltantes por ceros en cada columna
  df[is.na(df[, col]), col] <- 0
}
```

```
## Warning in `[<-.factor`(`*tmp*`, iseq, value = c(0, 0)): invalid factor level,
## NA generated
```

```
# Imprimir el dataframe con los valores faltantes reemplazados por 0
print(df)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      3        0   alfa-romero      gas        std    two convertible
## 2      3        0   alfa-romero      gas        std    two convertible
## 3      1        0   alfa-romero      gas        std    two   hatchback
## 4      2      164          audi      gas        std   four       sedan
## 5      2      164          audi      gas        std   four       sedan
## 6      2        0          audi      gas        std    two       sedan
## 7      1      158          audi      gas        std   four       sedan
## 8      1        0          audi      gas        std   four       wagon
## 9      1      158          audi      gas      turbo   four       sedan
```

```
## 10     0        0          audi      gas      turbo    two   hatchback
## 11     2      192           bmw      gas        std    two       sedan
## 12     0      192           bmw      gas        std   four       sedan
## 13     0      188           bmw      gas        std    two       sedan
## 14     0      188           bmw      gas        std   four       sedan
## 15     1        0           bmw      gas        std   four       sedan
## 16     0        0           bmw      gas        std   four       sedan
## 17     0        0           bmw      gas        std    two       sedan
## 18     0        0           bmw      gas        std   four       sedan
## 19     2      121     chevrolet      gas        std    two   hatchback
## 20     1       98     chevrolet      gas        std    two   hatchback
## 21     0       81     chevrolet      gas        std   four       sedan
## 22     1      118         dodge      gas        std    two   hatchback
## 23     1      118         dodge      gas        std    two   hatchback
## 24     1      118         dodge      gas      turbo    two   hatchback
## 25     1      148         dodge      gas        std   four   hatchback
## 26     1      148         dodge      gas        std   four       sedan
## 27     1      148         dodge      gas        std   four       sedan
## 28     1      148         dodge      gas      turbo   <NA>       sedan
## 29    -1      110         dodge      gas        std   four       wagon
## 30     3      145         dodge      gas      turbo    two   hatchback
## 31     2      137         honda      gas        std    two   hatchback
## 32     2      137         honda      gas        std    two   hatchback
## 33     1      101         honda      gas        std    two   hatchback
## 34     1      101         honda      gas        std    two   hatchback
## 35     1      101         honda      gas        std    two   hatchback
## 36     0      110         honda      gas        std   four       sedan
## 37     0       78         honda      gas        std   four       wagon
## 38     0      106         honda      gas        std    two   hatchback
## 39     0      106         honda      gas        std    two   hatchback
## 40     0       85         honda      gas        std   four       sedan
## 41     0       85         honda      gas        std   four       sedan
## 42     0       85         honda      gas        std   four       sedan
## 43     1      107         honda      gas        std    two       sedan
## 44     0        0         isuzu      gas        std   four       sedan
## 45     1        0         isuzu      gas        std    two       sedan
## 46     0        0         isuzu      gas        std   four       sedan
## 47     2        0         isuzu      gas        std    two   hatchback
## 48     0      145        jaguar      gas        std   four       sedan
## 49     0        0        jaguar      gas        std   four       sedan
## 50     0        0        jaguar      gas        std    two       sedan
## 51     1      104         mazda      gas        std    two   hatchback
## 52     1      104         mazda      gas        std    two   hatchback
## 53     1      104         mazda      gas        std    two   hatchback
## 54     1      113         mazda      gas        std   four       sedan
## 55     1      113         mazda      gas        std   four       sedan
## 56     3      150         mazda      gas        std    two   hatchback
## 57     3      150         mazda      gas        std    two   hatchback
## 58     3      150         mazda      gas        std    two   hatchback
## 59     3      150         mazda      gas        std    two   hatchback
## 60     1      129         mazda      gas        std    two   hatchback
## 61     0      115         mazda      gas        std   four       sedan
## 62     1      129         mazda      gas        std    two   hatchback
## 63     0      115         mazda      gas        std   four       sedan
```

```
## 64     0        0         mazda   diesel        std   <NA>       sedan
## 65     0      115         mazda      gas        std   four   hatchback
## 66     0      118         mazda      gas        std   four       sedan
## 67     0        0         mazda   diesel        std   four       sedan
## 68    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 69    -1       93 mercedes-benz   diesel      turbo   four       wagon
## 70     0       93 mercedes-benz   diesel      turbo    two     hardtop
## 71    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 72    -1        0 mercedes-benz      gas        std   four       sedan
## 73     3      142 mercedes-benz      gas        std    two convertible
## 74     0        0 mercedes-benz      gas        std   four       sedan
## 75     1        0 mercedes-benz      gas        std    two     hardtop
## 76     1        0       mercury      gas      turbo    two   hatchback
## 77     2      161    mitsubishi      gas        std    two   hatchback
## 78     2      161    mitsubishi      gas        std    two   hatchback
## 79     2      161    mitsubishi      gas        std    two   hatchback
## 80     1      161    mitsubishi      gas      turbo    two   hatchback
## 81     3      153    mitsubishi      gas      turbo    two   hatchback
## 82     3      153    mitsubishi      gas        std    two   hatchback
## 83     3        0    mitsubishi      gas      turbo    two   hatchback
## 84     3        0    mitsubishi      gas      turbo    two   hatchback
## 85     3        0    mitsubishi      gas      turbo    two   hatchback
## 86     1      125    mitsubishi      gas        std   four       sedan
## 87     1      125    mitsubishi      gas        std   four       sedan
## 88     1      125    mitsubishi      gas      turbo   four       sedan
## 89    -1      137    mitsubishi      gas        std   four       sedan
## 90     1      128        nissan      gas        std    two       sedan
## 91     1      128        nissan   diesel        std    two       sedan
## 92     1      128        nissan      gas        std    two       sedan
## 93     1      122        nissan      gas        std   four       sedan
## 94     1      103        nissan      gas        std   four       wagon
## 95     1      128        nissan      gas        std    two       sedan
## 96     1      128        nissan      gas        std    two   hatchback
## 97     1      122        nissan      gas        std   four       sedan
## 98     1      103        nissan      gas        std   four       wagon
## 99     2      168        nissan      gas        std    two     hardtop
## 100    0      106        nissan      gas        std   four   hatchback
## 101    0      106        nissan      gas        std   four       sedan
## 102    0      128        nissan      gas        std   four       sedan
## 103    0      108        nissan      gas        std   four       wagon
## 104    0      108        nissan      gas        std   four       sedan
## 105    3      194        nissan      gas        std    two   hatchback
## 106    3      194        nissan      gas      turbo    two   hatchback
## 107    1      231        nissan      gas        std    two   hatchback
## 108    0      161        peugot      gas        std   four       sedan
## 109    0      161        peugot   diesel      turbo   four       sedan
## 110    0        0        peugot      gas        std   four       wagon
## 111    0        0        peugot   diesel      turbo   four       wagon
## 112    0      161        peugot      gas        std   four       sedan
## 113    0      161        peugot   diesel      turbo   four       sedan
## 114    0        0        peugot      gas        std   four       wagon
## 115    0        0        peugot   diesel      turbo   four       wagon
## 116    0      161        peugot      gas        std   four       sedan
## 117    0      161        peugot   diesel      turbo   four       sedan
```

```
## 118    0      161        peugot      gas      turbo   four       sedan
## 119    1      119      plymouth      gas        std    two   hatchback
## 120    1      119      plymouth      gas      turbo    two   hatchback
## 121    1      154      plymouth      gas        std   four   hatchback
## 122    1      154      plymouth      gas        std   four       sedan
## 123    1      154      plymouth      gas        std   four       sedan
## 124   -1       74      plymouth      gas        std   four       wagon
## 125    3        0      plymouth      gas      turbo    two   hatchback
## 126    3      186       porsche      gas        std    two   hatchback
## 127    3        0       porsche      gas        std    two     hardtop
## 128    3        0       porsche      gas        std    two     hardtop
## 129    3        0       porsche      gas        std    two convertible
## 130    1        0       porsche      gas        std    two   hatchback
## 131    0        0       renault      gas        std   four       wagon
## 132    2        0       renault      gas        std    two   hatchback
## 133    3      150          saab      gas        std    two   hatchback
## 134    2      104          saab      gas        std   four       sedan
## 135    3      150          saab      gas        std    two   hatchback
## 136    2      104          saab      gas        std   four       sedan
## 137    3      150          saab      gas      turbo    two   hatchback
## 138    2      104          saab      gas      turbo   four       sedan
## 139    2       83        subaru      gas        std    two   hatchback
## 140    2       83        subaru      gas        std    two   hatchback
## 141    2       83        subaru      gas        std    two   hatchback
## 142    0      102        subaru      gas        std   four       sedan
## 143    0      102        subaru      gas        std   four       sedan
## 144    0      102        subaru      gas        std   four       sedan
## 145    0      102        subaru      gas        std   four       sedan
## 146    0      102        subaru      gas      turbo   four       sedan
## 147    0       89        subaru      gas        std   four       wagon
## 148    0       89        subaru      gas        std   four       wagon
## 149    0       85        subaru      gas        std   four       wagon
## 150    0       85        subaru      gas      turbo   four       wagon
## 151    1       87        toyota      gas        std    two   hatchback
## 152    1       87        toyota      gas        std    two   hatchback
## 153    1       74        toyota      gas        std   four   hatchback
## 154    0       77        toyota      gas        std   four       wagon
## 155    0       81        toyota      gas        std   four       wagon
## 156    0       91        toyota      gas        std   four       wagon
## 157    0       91        toyota      gas        std   four       sedan
## 158    0       91        toyota      gas        std   four   hatchback
## 159    0       91        toyota   diesel        std   four       sedan
## 160    0       91        toyota   diesel        std   four   hatchback
## 161    0       91        toyota      gas        std   four       sedan
## 162    0       91        toyota      gas        std   four   hatchback
## 163    0       91        toyota      gas        std   four       sedan
## 164    1      168        toyota      gas        std    two       sedan
## 165    1      168        toyota      gas        std    two   hatchback
## 166    1      168        toyota      gas        std    two       sedan
## 167    1      168        toyota      gas        std    two   hatchback
## 168    2      134        toyota      gas        std    two     hardtop
## 169    2      134        toyota      gas        std    two     hardtop
## 170    2      134        toyota      gas        std    two   hatchback
## 171    2      134        toyota      gas        std    two     hardtop
```

```
## 172    2      134        toyota      gas        std    two   hatchback
## 173    2      134        toyota      gas        std    two convertible
## 174   -1       65        toyota      gas        std   four       sedan
## 175   -1       65        toyota   diesel      turbo   four       sedan
## 176   -1       65        toyota      gas        std   four   hatchback
## 177   -1       65        toyota      gas        std   four       sedan
## 178   -1       65        toyota      gas        std   four   hatchback
## 179    3      197        toyota      gas        std    two   hatchback
## 180    3      197        toyota      gas        std    two   hatchback
## 181   -1       90        toyota      gas        std   four       sedan
## 182   -1        0        toyota      gas        std   four       wagon
## 183    2      122    volkswagen   diesel        std    two       sedan
## 184    2      122    volkswagen      gas        std    two       sedan
## 185    2       94    volkswagen   diesel        std   four       sedan
## 186    2       94    volkswagen      gas        std   four       sedan
## 187    2       94    volkswagen      gas        std   four       sedan
## 188    2       94    volkswagen   diesel      turbo   four       sedan
## 189    2       94    volkswagen      gas        std   four       sedan
## 190    3        0    volkswagen      gas        std    two convertible
## 191    3      256    volkswagen      gas        std    two   hatchback
## 192    0        0    volkswagen      gas        std   four       sedan
## 193    0        0    volkswagen   diesel      turbo   four       sedan
## 194    0        0    volkswagen      gas        std   four       wagon
## 195   -2      103         volvo      gas        std   four       sedan
## 196   -1       74         volvo      gas        std   four       wagon
## 197   -2      103         volvo      gas        std   four       sedan
## 198   -1       74         volvo      gas        std   four       wagon
## 199   -2      103         volvo      gas      turbo   four       sedan
## 200   -1       74         volvo      gas      turbo   four       wagon
## 201   -1       95         volvo      gas        std   four       sedan
## 202   -1       95         volvo      gas      turbo   four       sedan
## 203   -1       95         volvo      gas        std   four       sedan
## 204   -1       95         volvo   diesel      turbo   four       sedan
## 205   -1       95         volvo      gas      turbo   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           rwd          front      88.6  168.8  64.1   48.8       2548
## 2           rwd          front      88.6  168.8  64.1   48.8       2548
## 3           rwd          front      94.5  171.2  65.5   52.4       2823
## 4           fwd          front      99.8  176.6  66.2   54.3       2337
## 5           4wd          front      99.4  176.6  66.4   54.3       2824
## 6           fwd          front      99.8  177.3  66.3   53.1       2507
## 7           fwd          front     105.8  192.7  71.4   55.7       2844
## 8           fwd          front     105.8  192.7  71.4   55.7       2954
## 9           fwd          front     105.8  192.7  71.4   55.9       3086
## 10          4wd          front      99.5  178.2  67.9   52.0       3053
## 11          rwd          front     101.2  176.8  64.8   54.3       2395
## 12          rwd          front     101.2  176.8  64.8   54.3       2395
## 13          rwd          front     101.2  176.8  64.8   54.3       2710
## 14          rwd          front     101.2  176.8  64.8   54.3       2765
## 15          rwd          front     103.5  189.0  66.9   55.7       3055
## 16          rwd          front     103.5  189.0  66.9   55.7       3230
## 17          rwd          front     103.5  193.8  67.9   53.7       3380
## 18          rwd          front     110.0  197.0  70.9   56.3       3505
## 19          fwd          front      88.4  141.1  60.3   53.2       1488
```

```
## 20          fwd          front       94.5  155.9  63.6   52.0        1874
## 21          fwd          front       94.5  158.8  63.6   52.0        1909
## 22          fwd          front       93.7  157.3  63.8   50.8        1876
## 23          fwd          front       93.7  157.3  63.8   50.8        1876
## 24          fwd          front       93.7  157.3  63.8   50.8        2128
## 25          fwd          front       93.7  157.3  63.8   50.6        1967
## 26          fwd          front       93.7  157.3  63.8   50.6        1989
## 27          fwd          front       93.7  157.3  63.8   50.6        1989
## 28          fwd          front       93.7  157.3  63.8   50.6        2191
## 29          fwd          front      103.3  174.6  64.6   59.8        2535
## 30          fwd          front       95.9  173.2  66.3   50.2        2811
## 31          fwd          front       86.6  144.6  63.9   50.8        1713
## 32          fwd          front       86.6  144.6  63.9   50.8        1819
## 33          fwd          front       93.7  150.0  64.0   52.6        1837
## 34          fwd          front       93.7  150.0  64.0   52.6        1940
## 35          fwd          front       93.7  150.0  64.0   52.6        1956
## 36          fwd          front       96.5  163.4  64.0   54.5        2010
## 37          fwd          front       96.5  157.1  63.9   58.3        2024
## 38          fwd          front       96.5  167.5  65.2   53.3        2236
## 39          fwd          front       96.5  167.5  65.2   53.3        2289
## 40          fwd          front       96.5  175.4  65.2   54.1        2304
## 41          fwd          front       96.5  175.4  62.5   54.1        2372
## 42          fwd          front       96.5  175.4  65.2   54.1        2465
## 43          fwd          front       96.5  169.1  66.0   51.0        2293
## 44          rwd          front       94.3  170.7  61.8   53.5        2337
## 45          fwd          front       94.5  155.9  63.6   52.0        1874
## 46          fwd          front       94.5  155.9  63.6   52.0        1909
## 47          rwd          front       96.0  172.6  65.2   51.4        2734
## 48          rwd          front      113.0  199.6  69.6   52.8        4066
## 49          rwd          front      113.0  199.6  69.6   52.8        4066
## 50          rwd          front      102.0  191.7  70.6   47.8        3950
## 51          fwd          front       93.1  159.1  64.2   54.1        1890
## 52          fwd          front       93.1  159.1  64.2   54.1        1900
## 53          fwd          front       93.1  159.1  64.2   54.1        1905
## 54          fwd          front       93.1  166.8  64.2   54.1        1945
## 55          fwd          front       93.1  166.8  64.2   54.1        1950
## 56          rwd          front       95.3  169.0  65.7   49.6        2380
## 57          rwd          front       95.3  169.0  65.7   49.6        2380
## 58          rwd          front       95.3  169.0  65.7   49.6        2385
## 59          rwd          front       95.3  169.0  65.7   49.6        2500
## 60          fwd          front       98.8  177.8  66.5   53.7        2385
## 61          fwd          front       98.8  177.8  66.5   55.5        2410
## 62          fwd          front       98.8  177.8  66.5   53.7        2385
## 63          fwd          front       98.8  177.8  66.5   55.5        2410
## 64          fwd          front       98.8  177.8  66.5   55.5        2443
## 65          fwd          front       98.8  177.8  66.5   55.5        2425
## 66          rwd          front      104.9  175.0  66.1   54.4        2670
## 67          rwd          front      104.9  175.0  66.1   54.4        2700
## 68          rwd          front      110.0  190.9  70.3   56.5        3515
## 69          rwd          front      110.0  190.9  70.3   58.7        3750
## 70          rwd          front      106.7  187.5  70.3   54.9        3495
## 71          rwd          front      115.6  202.6  71.7   56.3        3770
## 72          rwd          front      115.6  202.6  71.7   56.5        3740
## 73          rwd          front       96.6  180.3  70.5   50.8        3685
```

```
## 74          rwd          front     120.9  208.1  71.7   56.7        3900
## 75          rwd          front     112.0  199.2  72.0   55.4        3715
## 76          rwd          front     102.7  178.4  68.0   54.8        2910
## 77          fwd          front      93.7  157.3  64.4   50.8        1918
## 78          fwd          front      93.7  157.3  64.4   50.8        1944
## 79          fwd          front      93.7  157.3  64.4   50.8        2004
## 80          fwd          front      93.0  157.3  63.8   50.8        2145
## 81          fwd          front      96.3  173.0  65.4   49.4        2370
## 82          fwd          front      96.3  173.0  65.4   49.4        2328
## 83          fwd          front      95.9  173.2  66.3   50.2        2833
## 84          fwd          front      95.9  173.2  66.3   50.2        2921
## 85          fwd          front      95.9  173.2  66.3   50.2        2926
## 86          fwd          front      96.3  172.4  65.4   51.6        2365
## 87          fwd          front      96.3  172.4  65.4   51.6        2405
## 88          fwd          front      96.3  172.4  65.4   51.6        2403
## 89          fwd          front      96.3  172.4  65.4   51.6        2403
## 90          fwd          front      94.5  165.3  63.8   54.5        1889
## 91          fwd          front      94.5  165.3  63.8   54.5        2017
## 92          fwd          front      94.5  165.3  63.8   54.5        1918
## 93          fwd          front      94.5  165.3  63.8   54.5        1938
## 94          fwd          front      94.5  170.2  63.8   53.5        2024
## 95          fwd          front      94.5  165.3  63.8   54.5        1951
## 96          fwd          front      94.5  165.6  63.8   53.3        2028
## 97          fwd          front      94.5  165.3  63.8   54.5        1971
## 98          fwd          front      94.5  170.2  63.8   53.5        2037
## 99          fwd          front      95.1  162.4  63.8   53.3        2008
## 100         fwd          front      97.2  173.4  65.2   54.7        2324
## 101         fwd          front      97.2  173.4  65.2   54.7        2302
## 102         fwd          front     100.4  181.7  66.5   55.1        3095
## 103         fwd          front     100.4  184.6  66.5   56.1        3296
## 104         fwd          front     100.4  184.6  66.5   55.1        3060
## 105         rwd          front      91.3  170.7  67.9   49.7        3071
## 106         rwd          front      91.3  170.7  67.9   49.7        3139
## 107         rwd          front      99.2  178.5  67.9   49.7        3139
## 108         rwd          front     107.9  186.7  68.4   56.7        3020
## 109         rwd          front     107.9  186.7  68.4   56.7        3197
## 110         rwd          front     114.2  198.9  68.4   58.7        3230
## 111         rwd          front     114.2  198.9  68.4   58.7        3430
## 112         rwd          front     107.9  186.7  68.4   56.7        3075
## 113         rwd          front     107.9  186.7  68.4   56.7        3252
## 114         rwd          front     114.2  198.9  68.4   56.7        3285
## 115         rwd          front     114.2  198.9  68.4   58.7        3485
## 116         rwd          front     107.9  186.7  68.4   56.7        3075
## 117         rwd          front     107.9  186.7  68.4   56.7        3252
## 118         rwd          front     108.0  186.7  68.3   56.0        3130
## 119         fwd          front      93.7  157.3  63.8   50.8        1918
## 120         fwd          front      93.7  157.3  63.8   50.8        2128
## 121         fwd          front      93.7  157.3  63.8   50.6        1967
## 122         fwd          front      93.7  167.3  63.8   50.8        1989
## 123         fwd          front      93.7  167.3  63.8   50.8        2191
## 124         fwd          front     103.3  174.6  64.6   59.8        2535
## 125         rwd          front      95.9  173.2  66.3   50.2        2818
## 126         rwd          front      94.5  168.9  68.3   50.2        2778
## 127         rwd           rear      89.5  168.9  65.0   51.6        2756
```

```
## 128         rwd           rear      89.5  168.9  65.0   51.6       2756
## 129         rwd           rear      89.5  168.9  65.0   51.6       2800
## 130         rwd          front      98.4  175.7  72.3   50.5       3366
## 131         fwd          front      96.1  181.5  66.5   55.2       2579
## 132         fwd          front      96.1  176.8  66.6   50.5       2460
## 133         fwd          front      99.1  186.6  66.5   56.1       2658
## 134         fwd          front      99.1  186.6  66.5   56.1       2695
## 135         fwd          front      99.1  186.6  66.5   56.1       2707
## 136         fwd          front      99.1  186.6  66.5   56.1       2758
## 137         fwd          front      99.1  186.6  66.5   56.1       2808
## 138         fwd          front      99.1  186.6  66.5   56.1       2847
## 139         fwd          front      93.7  156.9  63.4   53.7       2050
## 140         fwd          front      93.7  157.9  63.6   53.7       2120
## 141         4wd          front      93.3  157.3  63.8   55.7       2240
## 142         fwd          front      97.2  172.0  65.4   52.5       2145
## 143         fwd          front      97.2  172.0  65.4   52.5       2190
## 144         fwd          front      97.2  172.0  65.4   52.5       2340
## 145         4wd          front      97.0  172.0  65.4   54.3       2385
## 146         4wd          front      97.0  172.0  65.4   54.3       2510
## 147         fwd          front      97.0  173.5  65.4   53.0       2290
## 148         fwd          front      97.0  173.5  65.4   53.0       2455
## 149         4wd          front      96.9  173.6  65.4   54.9       2420
## 150         4wd          front      96.9  173.6  65.4   54.9       2650
## 151         fwd          front      95.7  158.7  63.6   54.5       1985
## 152         fwd          front      95.7  158.7  63.6   54.5       2040
## 153         fwd          front      95.7  158.7  63.6   54.5       2015
## 154         fwd          front      95.7  169.7  63.6   59.1       2280
## 155         4wd          front      95.7  169.7  63.6   59.1       2290
## 156         4wd          front      95.7  169.7  63.6   59.1       3110
## 157         fwd          front      95.7  166.3  64.4   53.0       2081
## 158         fwd          front      95.7  166.3  64.4   52.8       2109
## 159         fwd          front      95.7  166.3  64.4   53.0       2275
## 160         fwd          front      95.7  166.3  64.4   52.8       2275
## 161         fwd          front      95.7  166.3  64.4   53.0       2094
## 162         fwd          front      95.7  166.3  64.4   52.8       2122
## 163         fwd          front      95.7  166.3  64.4   52.8       2140
## 164         rwd          front      94.5  168.7  64.0   52.6       2169
## 165         rwd          front      94.5  168.7  64.0   52.6       2204
## 166         rwd          front      94.5  168.7  64.0   52.6       2265
## 167         rwd          front      94.5  168.7  64.0   52.6       2300
## 168         rwd          front      98.4  176.2  65.6   52.0       2540
## 169         rwd          front      98.4  176.2  65.6   52.0       2536
## 170         rwd          front      98.4  176.2  65.6   52.0       2551
## 171         rwd          front      98.4  176.2  65.6   52.0       2679
## 172         rwd          front      98.4  176.2  65.6   52.0       2714
## 173         rwd          front      98.4  176.2  65.6   53.0       2975
## 174         fwd          front     102.4  175.6  66.5   54.9       2326
## 175         fwd          front     102.4  175.6  66.5   54.9       2480
## 176         fwd          front     102.4  175.6  66.5   53.9       2414
## 177         fwd          front     102.4  175.6  66.5   54.9       2414
## 178         fwd          front     102.4  175.6  66.5   53.9       2458
## 179         rwd          front     102.9  183.5  67.7   52.0       2976
## 180         rwd          front     102.9  183.5  67.7   52.0       3016
## 181         rwd          front     104.5  187.8  66.5   54.1       3131
```

```
## 182         rwd          front     104.5  187.8  66.5   54.1       3151
## 183         fwd          front      97.3  171.7  65.5   55.7       2261
## 184         fwd          front      97.3  171.7  65.5   55.7       2209
## 185         fwd          front      97.3  171.7  65.5   55.7       2264
## 186         fwd          front      97.3  171.7  65.5   55.7       2212
## 187         fwd          front      97.3  171.7  65.5   55.7       2275
## 188         fwd          front      97.3  171.7  65.5   55.7       2319
## 189         fwd          front      97.3  171.7  65.5   55.7       2300
## 190         fwd          front      94.5  159.3  64.2   55.6       2254
## 191         fwd          front      94.5  165.7  64.0   51.4       2221
## 192         fwd          front     100.4  180.2  66.9   55.1       2661
## 193         fwd          front     100.4  180.2  66.9   55.1       2579
## 194         fwd          front     100.4  183.1  66.9   55.1       2563
## 195         rwd          front     104.3  188.8  67.2   56.2       2912
## 196         rwd          front     104.3  188.8  67.2   57.5       3034
## 197         rwd          front     104.3  188.8  67.2   56.2       2935
## 198         rwd          front     104.3  188.8  67.2   57.5       3042
## 199         rwd          front     104.3  188.8  67.2   56.2       3045
## 200         rwd          front     104.3  188.8  67.2   57.5       3157
## 201         rwd          front     109.1  188.8  68.9   55.5       2952
## 202         rwd          front     109.1  188.8  68.8   55.5       3049
## 203         rwd          front     109.1  188.8  68.9   55.5       3012
## 204         rwd          front     109.1  188.8  68.9   55.5       3217
## 205         rwd          front     109.1  188.8  68.9   55.5       3062
##     engineType nrCylinds engineSize fuelSystem bore stroke compressionRatio
## 1         dohc      four        130       mpfi 3.47   2.68             9.00
## 2         dohc      four        130       mpfi 3.47   2.68             9.00
## 3         ohcv       six        152       mpfi 2.68   3.47             9.00
## 4          ohc      four        109       mpfi 3.19   3.40            10.00
## 5          ohc      five        136       mpfi 3.19   3.40             8.00
## 6          ohc      five        136       mpfi 3.19   3.40             8.50
## 7          ohc      five        136       mpfi 3.19   3.40             8.50
## 8          ohc      five        136       mpfi 3.19   3.40             8.50
## 9          ohc      five        131       mpfi 3.13   3.40             8.30
## 10         ohc      five        131       mpfi 3.13   3.40             7.00
## 11         ohc      four        108       mpfi 3.50   2.80             8.80
## 12         ohc      four        108       mpfi 3.50   2.80             8.80
## 13         ohc       six        164       mpfi 3.31   3.19             9.00
## 14         ohc       six        164       mpfi 3.31   3.19             9.00
## 15         ohc       six        164       mpfi 3.31   3.19             9.00
## 16         ohc       six        209       mpfi 3.62   3.39             8.00
## 17         ohc       six        209       mpfi 3.62   3.39             8.00
## 18         ohc       six        209       mpfi 3.62   3.39             8.00
## 19           l     three         61       2bbl 2.91   3.03             9.50
## 20         ohc      four         90       2bbl 3.03   3.11             9.60
## 21         ohc      four         90       2bbl 3.03   3.11             9.60
## 22         ohc      four         90       2bbl 2.97   3.23             9.41
## 23         ohc      four         90       2bbl 2.97   3.23             9.40
## 24         ohc      four         98       mpfi 3.03   3.39             7.60
## 25         ohc      four         90       2bbl 2.97   3.23             9.40
## 26         ohc      four         90       2bbl 2.97   3.23             9.40
## 27         ohc      four         90       2bbl 2.97   3.23             9.40
## 28         ohc      four         98       mpfi 3.03   3.39             7.60
## 29         ohc      four        122       2bbl 3.34   3.46             8.50
```

```
## 30         ohc      four        156        mfi 3.60   3.90            7.00
## 31         ohc      four         92       1bbl 2.91   3.41            9.60
## 32         ohc      four         92       1bbl 2.91   3.41            9.20
## 33         ohc      four         79       1bbl 2.91   3.07           10.10
## 34         ohc      four         92       1bbl 2.91   3.41            9.20
## 35         ohc      four         92       1bbl 2.91   3.41            9.20
## 36         ohc      four         92       1bbl 2.91   3.41            9.20
## 37         ohc      four         92       1bbl 2.92   3.41            9.20
## 38         ohc      four        110       1bbl 3.15   3.58            9.00
## 39         ohc      four        110       1bbl 3.15   3.58            9.00
## 40         ohc      four        110       1bbl 3.15   3.58            9.00
## 41         ohc      four        110       1bbl 3.15   3.58            9.00
## 42         ohc      four        110       mpfi 3.15   3.58            9.00
## 43         ohc      four        110       2bbl 3.15   3.58            9.10
## 44         ohc      four        111       2bbl 3.31   3.23            8.50
## 45         ohc      four         90       2bbl 3.03   3.11            9.60
## 46         ohc      four         90       2bbl 3.03   3.11            9.60
## 47         ohc      four        119       spfi 3.43   3.23            9.20
## 48        dohc       six        258       mpfi 3.63   4.17            8.10
## 49        dohc       six        258       mpfi 3.63   4.17            8.10
## 50        ohcv    twelve        326       mpfi 3.54   2.76           11.50
## 51         ohc      four         91       2bbl 3.03   3.15            9.00
## 52         ohc      four         91       2bbl 3.03   3.15            9.00
## 53         ohc      four         91       2bbl 3.03   3.15            9.00
## 54         ohc      four         91       2bbl 3.03   3.15            9.00
## 55         ohc      four         91       2bbl 3.08   3.15            9.00
## 56       rotor       two         70       4bbl 0.00   0.00            9.40
## 57       rotor       two         70       4bbl 0.00   0.00            9.40
## 58       rotor       two         70       4bbl 0.00   0.00            9.40
## 59       rotor       two         80       mpfi 0.00   0.00            9.40
## 60         ohc      four        122       2bbl 3.39   3.39            8.60
## 61         ohc      four        122       2bbl 3.39   3.39            8.60
## 62         ohc      four        122       2bbl 3.39   3.39            8.60
## 63         ohc      four        122       2bbl 3.39   3.39            8.60
## 64         ohc      four        122        idi 3.39   3.39           22.70
## 65         ohc      four        122       2bbl 3.39   3.39            8.60
## 66         ohc      four        140       mpfi 3.76   3.16            8.00
## 67         ohc      four        134        idi 3.43   3.64           22.00
## 68         ohc      five        183        idi 3.58   3.64           21.50
## 69         ohc      five        183        idi 3.58   3.64           21.50
## 70         ohc      five        183        idi 3.58   3.64           21.50
## 71         ohc      five        183        idi 3.58   3.64           21.50
## 72        ohcv     eight        234       mpfi 3.46   3.10            8.30
## 73        ohcv     eight        234       mpfi 3.46   3.10            8.30
## 74        ohcv     eight        308       mpfi 3.80   3.35            8.00
## 75        ohcv     eight        304       mpfi 3.80   3.35            8.00
## 76         ohc      four        140       mpfi 3.78   3.12            8.00
## 77         ohc      four         92       2bbl 2.97   3.23            9.40
## 78         ohc      four         92       2bbl 2.97   3.23            9.40
## 79         ohc      four         92       2bbl 2.97   3.23            9.40
## 80         ohc      four         98       spdi 3.03   3.39            7.60
## 81         ohc      four        110       spdi 3.17   3.46            7.50
## 82         ohc      four        122       2bbl 3.35   3.46            8.50
## 83         ohc      four        156       spdi 3.58   3.86            7.00
```

```
## 84         ohc      four        156       spdi 3.59   3.86            7.00
## 85         ohc      four        156       spdi 3.59   3.86            7.00
## 86         ohc      four        122       2bbl 3.35   3.46            8.50
## 87         ohc      four        122       2bbl 3.35   3.46            8.50
## 88         ohc      four        110       spdi 3.17   3.46            7.50
## 89         ohc      four        110       spdi 3.17   3.46            7.50
## 90         ohc      four         97       2bbl 3.15   3.29            9.40
## 91         ohc      four        103        idi 2.99   3.47           21.90
## 92         ohc      four         97       2bbl 3.15   3.29            9.40
## 93         ohc      four         97       2bbl 3.15   3.29            9.40
## 94         ohc      four         97       2bbl 3.15   3.29            9.40
## 95         ohc      four         97       2bbl 3.15   3.29            9.40
## 96         ohc      four         97       2bbl 3.15   3.29            9.40
## 97         ohc      four         97       2bbl 3.15   3.29            9.40
## 98         ohc      four         97       2bbl 3.15   3.29            9.40
## 99         ohc      four         97       2bbl 3.15   3.29            9.40
## 100        ohc      four        120       2bbl 3.33   3.47            8.50
## 101        ohc      four        120       2bbl 3.33   3.47            8.50
## 102       ohcv       six        181       mpfi 3.43   3.27            9.00
## 103       ohcv       six        181       mpfi 3.43   3.27            9.00
## 104       ohcv       six        181       mpfi 3.43   3.27            9.00
## 105       ohcv       six        181       mpfi 3.43   3.27            9.00
## 106       ohcv       six        181       mpfi 3.43   3.27            7.80
## 107       ohcv       six        181       mpfi 3.43   3.27            9.00
## 108          l      four        120       mpfi 3.46   3.19            8.40
## 109          l      four        152        idi 3.70   3.52           21.00
## 110          l      four        120       mpfi 3.46   3.19            8.40
## 111          l      four        152        idi 3.70   3.52           21.00
## 112          l      four        120       mpfi 3.46   2.19            8.40
## 113          l      four        152        idi 3.70   3.52           21.00
## 114          l      four        120       mpfi 3.46   2.19            8.40
## 115          l      four        152        idi 3.70   3.52           21.00
## 116          l      four        120       mpfi 3.46   3.19            8.40
## 117          l      four        152        idi 3.70   3.52           21.00
## 118          l      four        134       mpfi 3.61   3.21            7.00
## 119        ohc      four         90       2bbl 2.97   3.23            9.40
## 120        ohc      four         98       spdi 3.03   3.39            7.60
## 121        ohc      four         90       2bbl 2.97   3.23            9.40
## 122        ohc      four         90       2bbl 2.97   3.23            9.40
## 123        ohc      four         98       2bbl 2.97   3.23            9.40
## 124        ohc      four        122       2bbl 3.35   3.46            8.50
## 125        ohc      four        156       spdi 3.59   3.86            7.00
## 126        ohc      four        151       mpfi 3.94   3.11            9.50
## 127       ohcf       six        194       mpfi 3.74   2.90            9.50
## 128       ohcf       six        194       mpfi 3.74   2.90            9.50
## 129       ohcf       six        194       mpfi 3.74   2.90            9.50
## 130      dohcv     eight        203       mpfi 3.94   3.11           10.00
## 131        ohc      four        132       mpfi 3.46   3.90            8.70
## 132        ohc      four        132       mpfi 3.46   3.90            8.70
## 133        ohc      four        121       mpfi 3.54   3.07            9.31
## 134        ohc      four        121       mpfi 3.54   3.07            9.30
## 135        ohc      four        121       mpfi 2.54   2.07            9.30
## 136        ohc      four        121       mpfi 3.54   3.07            9.30
## 137       dohc      four        121       mpfi 3.54   3.07            9.00
```

```
## 138       dohc      four        121       mpfi 3.54   3.07            9.00
## 139       ohcf      four         97       2bbl 3.62   2.36            9.00
## 140       ohcf      four        108       2bbl 3.62   2.64            8.70
## 141       ohcf      four        108       2bbl 3.62   2.64            8.70
## 142       ohcf      four        108       2bbl 3.62   2.64            9.50
## 143       ohcf      four        108       2bbl 3.62   2.64            9.50
## 144       ohcf      four        108       mpfi 3.62   2.64            9.00
## 145       ohcf      four        108       2bbl 3.62   2.64            9.00
## 146       ohcf      four        108       mpfi 3.62   2.64            7.70
## 147       ohcf      four        108       2bbl 3.62   2.64            9.00
## 148       ohcf      four        108       mpfi 3.62   2.64            9.00
## 149       ohcf      four        108       2bbl 3.62   2.64            9.00
## 150       ohcf      four        108       mpfi 3.62   2.64            7.70
## 151        ohc      four         92       2bbl 3.05   3.03            9.00
## 152        ohc      four         92       2bbl 3.05   3.03            9.00
## 153        ohc      four         92       2bbl 3.05   3.03            9.00
## 154        ohc      four         92       2bbl 3.05   3.03            9.00
## 155        ohc      four         92       2bbl 3.05   3.03            9.00
## 156        ohc      four         92       2bbl 3.05   3.03            9.00
## 157        ohc      four         98       2bbl 3.19   3.03            9.00
## 158        ohc      four         98       2bbl 3.19   3.03            9.00
## 159        ohc      four        110        idi 3.27   3.35           22.50
## 160        ohc      four        110        idi 3.27   3.35           22.50
## 161        ohc      four         98       2bbl 3.19   3.03            9.00
## 162        ohc      four         98       2bbl 3.19   3.03            9.00
## 163        ohc      four         98       2bbl 3.19   3.03            9.00
## 164        ohc      four         98       2bbl 3.19   3.03            9.00
## 165        ohc      four         98       2bbl 3.19   3.03            9.00
## 166       dohc      four         98       mpfi 3.24   3.08            9.40
## 167       dohc      four         98       mpfi 3.24   3.08            9.40
## 168        ohc      four        146       mpfi 3.62   3.50            9.30
## 169        ohc      four        146       mpfi 3.62   3.50            9.30
## 170        ohc      four        146       mpfi 3.62   3.50            9.30
## 171        ohc      four        146       mpfi 3.62   3.50            9.30
## 172        ohc      four        146       mpfi 3.62   3.50            9.30
## 173        ohc      four        146       mpfi 3.62   3.50            9.30
## 174        ohc      four        122       mpfi 3.31   3.54            8.70
## 175        ohc      four        110        idi 3.27   3.35           22.50
## 176        ohc      four        122       mpfi 3.31   3.54            8.70
## 177        ohc      four        122       mpfi 3.31   3.54            8.70
## 178        ohc      four        122       mpfi 3.31   3.54            8.70
## 179       dohc       six        171       mpfi 3.27   3.35            9.30
## 180       dohc       six        171       mpfi 3.27   3.35            9.30
## 181       dohc       six        171       mpfi 3.27   3.35            9.20
## 182       dohc       six        161       mpfi 3.27   3.35            9.20
## 183        ohc      four         97        idi 3.01   3.40           23.00
## 184        ohc      four        109       mpfi 3.19   3.40            9.00
## 185        ohc      four         97        idi 3.01   3.40           23.00
## 186        ohc      four        109       mpfi 3.19   3.40            9.00
## 187        ohc      four        109       mpfi 3.19   3.40            9.00
## 188        ohc      four         97        idi 3.01   3.40           23.00
## 189        ohc      four        109       mpfi 3.19   3.40           10.00
## 190        ohc      four        109       mpfi 3.19   3.40            8.50
## 191        ohc      four        109       mpfi 3.19   3.40            8.50
```

```
## 192        ohc      five        136       mpfi 3.19   3.40            8.50
## 193        ohc      four         97        idi 3.01   3.40           23.00
## 194        ohc      four        109       mpfi 3.19   3.40            9.00
## 195        ohc      four        141       mpfi 3.78   3.15            9.50
## 196        ohc      four        141       mpfi 3.78   3.15            9.50
## 197        ohc      four        141       mpfi 3.78   3.15            9.50
## 198        ohc      four        141       mpfi 3.78   3.15            9.50
## 199        ohc      four        130       mpfi 3.62   3.15            7.50
## 200        ohc      four        130       mpfi 3.62   3.15            7.50
## 201        ohc      four        141       mpfi 3.78   3.15            9.50
## 202        ohc      four        141       mpfi 3.78   3.15            8.70
## 203       ohcv       six        173       mpfi 3.58   2.87            8.80
## 204        ohc       six        145        idi 3.01   3.40           23.00
## 205        ohc      four        141       mpfi 3.78   3.15            9.50
##     horsePower peakRpm cityMpg highwayMpg price
## 1          111    5000      21         27 13495
## 2          111    5000      21         27 16500
## 3          154    5000      19         26 16500
## 4          102    5500      24         30 13950
## 5          115    5500      18         22 17450
## 6          110    5500      19         25 15250
## 7          110    5500      19         25 17710
## 8          110    5500      19         25 18920
## 9          140    5500      17         20 23875
## 10         160    5500      16         22     0
## 11         101    5800      23         29 16430
## 12         101    5800      23         29 16925
## 13         121    4250      21         28 20970
## 14         121    4250      21         28 21105
## 15         121    4250      20         25 24565
## 16         182    5400      16         22 30760
## 17         182    5400      16         22 41315
## 18         182    5400      15         20 36880
## 19          48    5100      47         53  5151
## 20          70    5400      38         43  6295
## 21          70    5400      38         43  6575
## 22          68    5500      37         41  5572
## 23          68    5500      31         38  6377
## 24         102    5500      24         30  7957
## 25          68    5500      31         38  6229
## 26          68    5500      31         38  6692
## 27          68    5500      31         38  7609
## 28         102    5500      24         30  8558
## 29          88    5000      24         30  8921
## 30         145    5000      19         24 12964
## 31          58    4800      49         54  6479
## 32          76    6000      31         38  6855
## 33          60    5500      38         42  5399
## 34          76    6000      30         34  6529
## 35          76    6000      30         34  7129
## 36          76    6000      30         34  7295
## 37          76    6000      30         34  7295
## 38          86    5800      27         33  7895
## 39          86    5800      27         33  9095
```

```
## 40          86    5800       27          33  8845
## 41          86    5800       27          33 10295
## 42         101    5800       24          28 12945
## 43         100    5500       25          31 10345
## 44          78    4800       24          29  6785
## 45          70    5400       38          43     0
## 46          70    5400       38          43     0
## 47          90    5000       24          29 11048
## 48         176    4750       15          19 32250
## 49         176    4750       15          19 35550
## 50         262    5000       13          17 36000
## 51          68    5000       30          31  5195
## 52          68    5000       31          38  6095
## 53          68    5000       31          38  6795
## 54          68    5000       31          38  6695
## 55          68    5000       31          38  7395
## 56         101    6000       17          23 10945
## 57         101    6000       17          23 11845
## 58         101    6000       17          23 13645
## 59         135    6000       16          23 15645
## 60          84    4800       26          32  8845
## 61          84    4800       26          32  8495
## 62          84    4800       26          32 10595
## 63          84    4800       26          32 10245
## 64          64    4650       36          42 10795
## 65          84    4800       26          32 11245
## 66         120    5000       19          27 18280
## 67          72    4200       31          39 18344
## 68         123    4350       22          25 25552
## 69         123    4350       22          25 28248
## 70         123    4350       22          25 28176
## 71         123    4350       22          25 31600
## 72         155    4750       16          18 34184
## 73         155    4750       16          18 35056
## 74         184    4500       14          16 40960
## 75         184    4500       14          16 45400
## 76         175    5000       19          24 16503
## 77          68    5500       37          41  5389
## 78          68    5500       31          38  6189
## 79          68    5500       31          38  6669
## 80         102    5500       24          30  7689
## 81         116    5500       23          30  9959
## 82          88    5000       25          32  8499
## 83         145    5000       19          24 12629
## 84         145    5000       19          24 14869
## 85         145    5000       19          24 14489
## 86          88    5000       25          32  6989
## 87          88    5000       25          32  8189
## 88         116    5500       23          30  9279
## 89         116    5500       23          30  9279
## 90          69    5200       31          37  5499
## 91          55    4800       45          50  7099
## 92          69    5200       31          37  6649
## 93          69    5200       31          37  6849
```

```
## 94          69    5200       31          37  7349
## 95          69    5200       31          37  7299
## 96          69    5200       31          37  7799
## 97          69    5200       31          37  7499
## 98          69    5200       31          37  7999
## 99          69    5200       31          37  8249
## 100         97    5200       27          34  8949
## 101         97    5200       27          34  9549
## 102        152    5200       17          22 13499
## 103        152    5200       17          22 14399
## 104        152    5200       19          25 13499
## 105        160    5200       19          25 17199
## 106        200    5200       17          23 19699
## 107        160    5200       19          25 18399
## 108         97    5000       19          24 11900
## 109         95    4150       28          33 13200
## 110         97    5000       19          24 12440
## 111         95    4150       25          25 13860
## 112         95    5000       19          24 15580
## 113         95    4150       28          33 16900
## 114         95    5000       19          24 16695
## 115         95    4150       25          25 17075
## 116         97    5000       19          24 16630
## 117         95    4150       28          33 17950
## 118        142    5600       18          24 18150
## 119         68    5500       37          41  5572
## 120        102    5500       24          30  7957
## 121         68    5500       31          38  6229
## 122         68    5500       31          38  6692
## 123         68    5500       31          38  7609
## 124         88    5000       24          30  8921
## 125        145    5000       19          24 12764
## 126        143    5500       19          27 22018
## 127        207    5900       17          25 32528
## 128        207    5900       17          25 34028
## 129        207    5900       17          25 37028
## 130        288    5750       17          28     0
## 131          0       0       23          31  9295
## 132          0       0       23          31  9895
## 133        110    5250       21          28 11850
## 134        110    5250       21          28 12170
## 135        110    5250       21          28 15040
## 136        110    5250       21          28 15510
## 137        160    5500       19          26 18150
## 138        160    5500       19          26 18620
## 139         69    4900       31          36  5118
## 140         73    4400       26          31  7053
## 141         73    4400       26          31  7603
## 142         82    4800       32          37  7126
## 143         82    4400       28          33  7775
## 144         94    5200       26          32  9960
## 145         82    4800       24          25  9233
## 146        111    4800       24          29 11259
## 147         82    4800       28          32  7463
```

```
## 148         94    5200       25         31 10198
## 149         82    4800       23         29  8013
## 150        111    4800       23         23 11694
## 151         62    4800       35         39  5348
## 152         62    4800       31         38  6338
## 153         62    4800       31         38  6488
## 154         62    4800       31         37  6918
## 155         62    4800       27         32  7898
## 156         62    4800       27         32  8778
## 157         70    4800       30         37  6938
## 158         70    4800       30         37  7198
## 159         56    4500       34         36  7898
## 160         56    4500       38         47  7788
## 161         70    4800       38         47  7738
## 162         70    4800       28         34  8358
## 163         70    4800       28         34  9258
## 164         70    4800       29         34  8058
## 165         70    4800       29         34  8238
## 166        112    6600       26         29  9298
## 167        112    6600       26         29  9538
## 168        116    4800       24         30  8449
## 169        116    4800       24         30  9639
## 170        116    4800       24         30  9989
## 171        116    4800       24         30 11199
## 172        116    4800       24         30 11549
## 173        116    4800       24         30 17669
## 174         92    4200       29         34  8948
## 175         73    4500       30         33 10698
## 176         92    4200       27         32  9988
## 177         92    4200       27         32 10898
## 178         92    4200       27         32 11248
## 179        161    5200       20         24 16558
## 180        161    5200       19         24 15998
## 181        156    5200       20         24 15690
## 182        156    5200       19         24 15750
## 183         52    4800       37         46  7775
## 184         85    5250       27         34  7975
## 185         52    4800       37         46  7995
## 186         85    5250       27         34  8195
## 187         85    5250       27         34  8495
## 188         68    4500       37         42  9495
## 189        100    5500       26         32  9995
## 190         90    5500       24         29 11595
## 191         90    5500       24         29  9980
## 192        110    5500       19         24 13295
## 193         68    4500       33         38 13845
## 194         88    5500       25         31 12290
## 195        114    5400       23         28 12940
## 196        114    5400       23         28 13415
## 197        114    5400       24         28 15985
## 198        114    5400       24         28 16515
## 199        162    5100       17         22 18420
## 200        162    5100       17         22 18950
## 201        114    5400       23         28 16845
```

```
## 202        160    5300      19          25 19045
## 203        134    5500      18          23 21485
## 204        106    4800      26          27 22470
## 205        114    5400      19          25 22625
```

(e) Cree un nuevo conjunto de datos imputando la media en todas las columnas que tengan valores de tipo double.

```r
# Convertir el objeto en un dataframe
df <- as.data.frame(carIns)

# Calcula la Media e imputa en todas las columnas de tipo double
dataMedia <- df %>%
  mutate_if(is.double, ~ ifelse(is.na(.), mean(., na.rm = TRUE), .))
# mutate_if realiza cambios condicionales en las columnas de acuerdo a una condicion especifica
#is.double funcion que devuelve TRUE para las columnas que cumplan la condicion de tipo double

# Imprime el conjunto de datos
print(dataMedia)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      3       NA   alfa-romero      gas        std    two convertible
## 2      3       NA   alfa-romero      gas        std    two convertible
## 3      1       NA   alfa-romero      gas        std    two   hatchback
## 4      2      164          audi      gas        std   four       sedan
## 5      2      164          audi      gas        std   four       sedan
## 6      2       NA          audi      gas        std    two       sedan
## 7      1      158          audi      gas        std   four       sedan
## 8      1       NA          audi      gas        std   four       wagon
## 9      1      158          audi      gas      turbo   four       sedan
## 10     0       NA          audi      gas      turbo    two   hatchback
## 11     2      192           bmw      gas        std    two       sedan
## 12     0      192           bmw      gas        std   four       sedan
## 13     0      188           bmw      gas        std    two       sedan
## 14     0      188           bmw      gas        std   four       sedan
## 15     1       NA           bmw      gas        std   four       sedan
## 16     0       NA           bmw      gas        std   four       sedan
## 17     0       NA           bmw      gas        std    two       sedan
## 18     0       NA           bmw      gas        std   four       sedan
## 19     2      121     chevrolet      gas        std    two   hatchback
## 20     1       98     chevrolet      gas        std    two   hatchback
## 21     0       81     chevrolet      gas        std   four       sedan
## 22     1      118         dodge      gas        std    two   hatchback
## 23     1      118         dodge      gas        std    two   hatchback
## 24     1      118         dodge      gas      turbo    two   hatchback
## 25     1      148         dodge      gas        std   four   hatchback
## 26     1      148         dodge      gas        std   four       sedan
## 27     1      148         dodge      gas        std   four       sedan
## 28     1      148         dodge      gas      turbo   <NA>       sedan
## 29    -1      110         dodge      gas        std   four       wagon
## 30     3      145         dodge      gas      turbo    two   hatchback
## 31     2      137         honda      gas        std    two   hatchback
## 32     2      137         honda      gas        std    two   hatchback
## 33     1      101         honda      gas        std    two   hatchback
```

```
## 34     1      101         honda      gas        std    two   hatchback
## 35     1      101         honda      gas        std    two   hatchback
## 36     0      110         honda      gas        std   four       sedan
## 37     0       78         honda      gas        std   four       wagon
## 38     0      106         honda      gas        std    two   hatchback
## 39     0      106         honda      gas        std    two   hatchback
## 40     0       85         honda      gas        std   four       sedan
## 41     0       85         honda      gas        std   four       sedan
## 42     0       85         honda      gas        std   four       sedan
## 43     1      107         honda      gas        std    two       sedan
## 44     0       NA         isuzu      gas        std   four       sedan
## 45     1       NA         isuzu      gas        std    two       sedan
## 46     0       NA         isuzu      gas        std   four       sedan
## 47     2       NA         isuzu      gas        std    two   hatchback
## 48     0      145        jaguar      gas        std   four       sedan
## 49     0       NA        jaguar      gas        std   four       sedan
## 50     0       NA        jaguar      gas        std    two       sedan
## 51     1      104         mazda      gas        std    two   hatchback
## 52     1      104         mazda      gas        std    two   hatchback
## 53     1      104         mazda      gas        std    two   hatchback
## 54     1      113         mazda      gas        std   four       sedan
## 55     1      113         mazda      gas        std   four       sedan
## 56     3      150         mazda      gas        std    two   hatchback
## 57     3      150         mazda      gas        std    two   hatchback
## 58     3      150         mazda      gas        std    two   hatchback
## 59     3      150         mazda      gas        std    two   hatchback
## 60     1      129         mazda      gas        std    two   hatchback
## 61     0      115         mazda      gas        std   four       sedan
## 62     1      129         mazda      gas        std    two   hatchback
## 63     0      115         mazda      gas        std   four       sedan
## 64     0       NA         mazda   diesel        std   <NA>       sedan
## 65     0      115         mazda      gas        std   four   hatchback
## 66     0      118         mazda      gas        std   four       sedan
## 67     0       NA         mazda   diesel        std   four       sedan
## 68    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 69    -1       93 mercedes-benz   diesel      turbo   four       wagon
## 70     0       93 mercedes-benz   diesel      turbo    two     hardtop
## 71    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 72    -1       NA mercedes-benz      gas        std   four       sedan
## 73     3      142 mercedes-benz      gas        std    two convertible
## 74     0       NA mercedes-benz      gas        std   four       sedan
## 75     1       NA mercedes-benz      gas        std    two     hardtop
## 76     1       NA       mercury      gas      turbo    two   hatchback
## 77     2      161    mitsubishi      gas        std    two   hatchback
## 78     2      161    mitsubishi      gas        std    two   hatchback
## 79     2      161    mitsubishi      gas        std    two   hatchback
## 80     1      161    mitsubishi      gas      turbo    two   hatchback
## 81     3      153    mitsubishi      gas      turbo    two   hatchback
## 82     3      153    mitsubishi      gas        std    two   hatchback
## 83     3       NA    mitsubishi      gas      turbo    two   hatchback
## 84     3       NA    mitsubishi      gas      turbo    two   hatchback
## 85     3       NA    mitsubishi      gas      turbo    two   hatchback
## 86     1      125    mitsubishi      gas        std   four       sedan
## 87     1      125    mitsubishi      gas        std   four       sedan
```

```
## 88     1      125    mitsubishi      gas      turbo   four       sedan
## 89    -1      137    mitsubishi      gas        std   four       sedan
## 90     1      128        nissan      gas        std    two       sedan
## 91     1      128        nissan   diesel        std    two       sedan
## 92     1      128        nissan      gas        std    two       sedan
## 93     1      122        nissan      gas        std   four       sedan
## 94     1      103        nissan      gas        std   four       wagon
## 95     1      128        nissan      gas        std    two       sedan
## 96     1      128        nissan      gas        std    two   hatchback
## 97     1      122        nissan      gas        std   four       sedan
## 98     1      103        nissan      gas        std   four       wagon
## 99     2      168        nissan      gas        std    two     hardtop
## 100    0      106        nissan      gas        std   four   hatchback
## 101    0      106        nissan      gas        std   four       sedan
## 102    0      128        nissan      gas        std   four       sedan
## 103    0      108        nissan      gas        std   four       wagon
## 104    0      108        nissan      gas        std   four       sedan
## 105    3      194        nissan      gas        std    two   hatchback
## 106    3      194        nissan      gas      turbo    two   hatchback
## 107    1      231        nissan      gas        std    two   hatchback
## 108    0      161        peugot      gas        std   four       sedan
## 109    0      161        peugot   diesel      turbo   four       sedan
## 110    0       NA        peugot      gas        std   four       wagon
## 111    0       NA        peugot   diesel      turbo   four       wagon
## 112    0      161        peugot      gas        std   four       sedan
## 113    0      161        peugot   diesel      turbo   four       sedan
## 114    0       NA        peugot      gas        std   four       wagon
## 115    0       NA        peugot   diesel      turbo   four       wagon
## 116    0      161        peugot      gas        std   four       sedan
## 117    0      161        peugot   diesel      turbo   four       sedan
## 118    0      161        peugot      gas      turbo   four       sedan
## 119    1      119      plymouth      gas        std    two   hatchback
## 120    1      119      plymouth      gas      turbo    two   hatchback
## 121    1      154      plymouth      gas        std   four   hatchback
## 122    1      154      plymouth      gas        std   four       sedan
## 123    1      154      plymouth      gas        std   four       sedan
## 124   -1       74      plymouth      gas        std   four       wagon
## 125    3       NA      plymouth      gas      turbo    two   hatchback
## 126    3      186       porsche      gas        std    two   hatchback
## 127    3       NA       porsche      gas        std    two     hardtop
## 128    3       NA       porsche      gas        std    two     hardtop
## 129    3       NA       porsche      gas        std    two convertible
## 130    1       NA       porsche      gas        std    two   hatchback
## 131    0       NA       renault      gas        std   four       wagon
## 132    2       NA       renault      gas        std    two   hatchback
## 133    3      150          saab      gas        std    two   hatchback
## 134    2      104          saab      gas        std   four       sedan
## 135    3      150          saab      gas        std    two   hatchback
## 136    2      104          saab      gas        std   four       sedan
## 137    3      150          saab      gas      turbo    two   hatchback
## 138    2      104          saab      gas      turbo   four       sedan
## 139    2       83        subaru      gas        std    two   hatchback
## 140    2       83        subaru      gas        std    two   hatchback
## 141    2       83        subaru      gas        std    two   hatchback
```

```
## 142    0      102        subaru      gas        std   four       sedan
## 143    0      102        subaru      gas        std   four       sedan
## 144    0      102        subaru      gas        std   four       sedan
## 145    0      102        subaru      gas        std   four       sedan
## 146    0      102        subaru      gas      turbo   four       sedan
## 147    0       89        subaru      gas        std   four       wagon
## 148    0       89        subaru      gas        std   four       wagon
## 149    0       85        subaru      gas        std   four       wagon
## 150    0       85        subaru      gas      turbo   four       wagon
## 151    1       87        toyota      gas        std    two   hatchback
## 152    1       87        toyota      gas        std    two   hatchback
## 153    1       74        toyota      gas        std   four   hatchback
## 154    0       77        toyota      gas        std   four       wagon
## 155    0       81        toyota      gas        std   four       wagon
## 156    0       91        toyota      gas        std   four       wagon
## 157    0       91        toyota      gas        std   four       sedan
## 158    0       91        toyota      gas        std   four   hatchback
## 159    0       91        toyota   diesel        std   four       sedan
## 160    0       91        toyota   diesel        std   four   hatchback
## 161    0       91        toyota      gas        std   four       sedan
## 162    0       91        toyota      gas        std   four   hatchback
## 163    0       91        toyota      gas        std   four       sedan
## 164    1      168        toyota      gas        std    two       sedan
## 165    1      168        toyota      gas        std    two   hatchback
## 166    1      168        toyota      gas        std    two       sedan
## 167    1      168        toyota      gas        std    two   hatchback
## 168    2      134        toyota      gas        std    two     hardtop
## 169    2      134        toyota      gas        std    two     hardtop
## 170    2      134        toyota      gas        std    two   hatchback
## 171    2      134        toyota      gas        std    two     hardtop
## 172    2      134        toyota      gas        std    two   hatchback
## 173    2      134        toyota      gas        std    two convertible
## 174   -1       65        toyota      gas        std   four       sedan
## 175   -1       65        toyota   diesel      turbo   four       sedan
## 176   -1       65        toyota      gas        std   four   hatchback
## 177   -1       65        toyota      gas        std   four       sedan
## 178   -1       65        toyota      gas        std   four   hatchback
## 179    3      197        toyota      gas        std    two   hatchback
## 180    3      197        toyota      gas        std    two   hatchback
## 181   -1       90        toyota      gas        std   four       sedan
## 182   -1       NA        toyota      gas        std   four       wagon
## 183    2      122    volkswagen   diesel        std    two       sedan
## 184    2      122    volkswagen      gas        std    two       sedan
## 185    2       94    volkswagen   diesel        std   four       sedan
## 186    2       94    volkswagen      gas        std   four       sedan
## 187    2       94    volkswagen      gas        std   four       sedan
## 188    2       94    volkswagen   diesel      turbo   four       sedan
## 189    2       94    volkswagen      gas        std   four       sedan
## 190    3       NA    volkswagen      gas        std    two convertible
## 191    3      256    volkswagen      gas        std    two   hatchback
## 192    0       NA    volkswagen      gas        std   four       sedan
## 193    0       NA    volkswagen   diesel      turbo   four       sedan
## 194    0       NA    volkswagen      gas        std   four       wagon
## 195   -2      103         volvo      gas        std   four       sedan
```

```
## 196   -1       74         volvo      gas        std   four       wagon
## 197   -2      103         volvo      gas        std   four       sedan
## 198   -1       74         volvo      gas        std   four       wagon
## 199   -2      103         volvo      gas      turbo   four       sedan
## 200   -1       74         volvo      gas      turbo   four       wagon
## 201   -1       95         volvo      gas        std   four       sedan
## 202   -1       95         volvo      gas      turbo   four       sedan
## 203   -1       95         volvo      gas        std   four       sedan
## 204   -1       95         volvo   diesel      turbo   four       sedan
## 205   -1       95         volvo      gas      turbo   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           rwd          front      88.6  168.8  64.1   48.8       2548
## 2           rwd          front      88.6  168.8  64.1   48.8       2548
## 3           rwd          front      94.5  171.2  65.5   52.4       2823
## 4           fwd          front      99.8  176.6  66.2   54.3       2337
## 5           4wd          front      99.4  176.6  66.4   54.3       2824
## 6           fwd          front      99.8  177.3  66.3   53.1       2507
## 7           fwd          front     105.8  192.7  71.4   55.7       2844
## 8           fwd          front     105.8  192.7  71.4   55.7       2954
## 9           fwd          front     105.8  192.7  71.4   55.9       3086
## 10          4wd          front      99.5  178.2  67.9   52.0       3053
## 11          rwd          front     101.2  176.8  64.8   54.3       2395
## 12          rwd          front     101.2  176.8  64.8   54.3       2395
## 13          rwd          front     101.2  176.8  64.8   54.3       2710
## 14          rwd          front     101.2  176.8  64.8   54.3       2765
## 15          rwd          front     103.5  189.0  66.9   55.7       3055
## 16          rwd          front     103.5  189.0  66.9   55.7       3230
## 17          rwd          front     103.5  193.8  67.9   53.7       3380
## 18          rwd          front     110.0  197.0  70.9   56.3       3505
## 19          fwd          front      88.4  141.1  60.3   53.2       1488
## 20          fwd          front      94.5  155.9  63.6   52.0       1874
## 21          fwd          front      94.5  158.8  63.6   52.0       1909
## 22          fwd          front      93.7  157.3  63.8   50.8       1876
## 23          fwd          front      93.7  157.3  63.8   50.8       1876
## 24          fwd          front      93.7  157.3  63.8   50.8       2128
## 25          fwd          front      93.7  157.3  63.8   50.6       1967
## 26          fwd          front      93.7  157.3  63.8   50.6       1989
## 27          fwd          front      93.7  157.3  63.8   50.6       1989
## 28          fwd          front      93.7  157.3  63.8   50.6       2191
## 29          fwd          front     103.3  174.6  64.6   59.8       2535
## 30          fwd          front      95.9  173.2  66.3   50.2       2811
## 31          fwd          front      86.6  144.6  63.9   50.8       1713
## 32          fwd          front      86.6  144.6  63.9   50.8       1819
## 33          fwd          front      93.7  150.0  64.0   52.6       1837
## 34          fwd          front      93.7  150.0  64.0   52.6       1940
## 35          fwd          front      93.7  150.0  64.0   52.6       1956
## 36          fwd          front      96.5  163.4  64.0   54.5       2010
## 37          fwd          front      96.5  157.1  63.9   58.3       2024
## 38          fwd          front      96.5  167.5  65.2   53.3       2236
## 39          fwd          front      96.5  167.5  65.2   53.3       2289
## 40          fwd          front      96.5  175.4  65.2   54.1       2304
## 41          fwd          front      96.5  175.4  62.5   54.1       2372
## 42          fwd          front      96.5  175.4  65.2   54.1       2465
## 43          fwd          front      96.5  169.1  66.0   51.0       2293
```

```
## 44          rwd          front       94.3  170.7  61.8   53.5        2337
## 45          fwd          front       94.5  155.9  63.6   52.0        1874
## 46          fwd          front       94.5  155.9  63.6   52.0        1909
## 47          rwd          front       96.0  172.6  65.2   51.4        2734
## 48          rwd          front      113.0  199.6  69.6   52.8        4066
## 49          rwd          front      113.0  199.6  69.6   52.8        4066
## 50          rwd          front      102.0  191.7  70.6   47.8        3950
## 51          fwd          front       93.1  159.1  64.2   54.1        1890
## 52          fwd          front       93.1  159.1  64.2   54.1        1900
## 53          fwd          front       93.1  159.1  64.2   54.1        1905
## 54          fwd          front       93.1  166.8  64.2   54.1        1945
## 55          fwd          front       93.1  166.8  64.2   54.1        1950
## 56          rwd          front       95.3  169.0  65.7   49.6        2380
## 57          rwd          front       95.3  169.0  65.7   49.6        2380
## 58          rwd          front       95.3  169.0  65.7   49.6        2385
## 59          rwd          front       95.3  169.0  65.7   49.6        2500
## 60          fwd          front       98.8  177.8  66.5   53.7        2385
## 61          fwd          front       98.8  177.8  66.5   55.5        2410
## 62          fwd          front       98.8  177.8  66.5   53.7        2385
## 63          fwd          front       98.8  177.8  66.5   55.5        2410
## 64          fwd          front       98.8  177.8  66.5   55.5        2443
## 65          fwd          front       98.8  177.8  66.5   55.5        2425
## 66          rwd          front      104.9  175.0  66.1   54.4        2670
## 67          rwd          front      104.9  175.0  66.1   54.4        2700
## 68          rwd          front      110.0  190.9  70.3   56.5        3515
## 69          rwd          front      110.0  190.9  70.3   58.7        3750
## 70          rwd          front      106.7  187.5  70.3   54.9        3495
## 71          rwd          front      115.6  202.6  71.7   56.3        3770
## 72          rwd          front      115.6  202.6  71.7   56.5        3740
## 73          rwd          front       96.6  180.3  70.5   50.8        3685
## 74          rwd          front      120.9  208.1  71.7   56.7        3900
## 75          rwd          front      112.0  199.2  72.0   55.4        3715
## 76          rwd          front      102.7  178.4  68.0   54.8        2910
## 77          fwd          front       93.7  157.3  64.4   50.8        1918
## 78          fwd          front       93.7  157.3  64.4   50.8        1944
## 79          fwd          front       93.7  157.3  64.4   50.8        2004
## 80          fwd          front       93.0  157.3  63.8   50.8        2145
## 81          fwd          front       96.3  173.0  65.4   49.4        2370
## 82          fwd          front       96.3  173.0  65.4   49.4        2328
## 83          fwd          front       95.9  173.2  66.3   50.2        2833
## 84          fwd          front       95.9  173.2  66.3   50.2        2921
## 85          fwd          front       95.9  173.2  66.3   50.2        2926
## 86          fwd          front       96.3  172.4  65.4   51.6        2365
## 87          fwd          front       96.3  172.4  65.4   51.6        2405
## 88          fwd          front       96.3  172.4  65.4   51.6        2403
## 89          fwd          front       96.3  172.4  65.4   51.6        2403
## 90          fwd          front       94.5  165.3  63.8   54.5        1889
## 91          fwd          front       94.5  165.3  63.8   54.5        2017
## 92          fwd          front       94.5  165.3  63.8   54.5        1918
## 93          fwd          front       94.5  165.3  63.8   54.5        1938
## 94          fwd          front       94.5  170.2  63.8   53.5        2024
## 95          fwd          front       94.5  165.3  63.8   54.5        1951
## 96          fwd          front       94.5  165.6  63.8   53.3        2028
## 97          fwd          front       94.5  165.3  63.8   54.5        1971
```

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## 98          fwd          front       94.5  170.2  63.8   53.5        2037
## 99          fwd          front       95.1  162.4  63.8   53.3        2008
## 100         fwd          front       97.2  173.4  65.2   54.7        2324
## 101         fwd          front       97.2  173.4  65.2   54.7        2302
## 102         fwd          front      100.4  181.7  66.5   55.1        3095
## 103         fwd          front      100.4  184.6  66.5   56.1        3296
## 104         fwd          front      100.4  184.6  66.5   55.1        3060
## 105         rwd          front       91.3  170.7  67.9   49.7        3071
## 106         rwd          front       91.3  170.7  67.9   49.7        3139
## 107         rwd          front       99.2  178.5  67.9   49.7        3139
## 108         rwd          front      107.9  186.7  68.4   56.7        3020
## 109         rwd          front      107.9  186.7  68.4   56.7        3197
## 110         rwd          front      114.2  198.9  68.4   58.7        3230
## 111         rwd          front      114.2  198.9  68.4   58.7        3430
## 112         rwd          front      107.9  186.7  68.4   56.7        3075
## 113         rwd          front      107.9  186.7  68.4   56.7        3252
## 114         rwd          front      114.2  198.9  68.4   56.7        3285
## 115         rwd          front      114.2  198.9  68.4   58.7        3485
## 116         rwd          front      107.9  186.7  68.4   56.7        3075
## 117         rwd          front      107.9  186.7  68.4   56.7        3252
## 118         rwd          front      108.0  186.7  68.3   56.0        3130
## 119         fwd          front       93.7  157.3  63.8   50.8        1918
## 120         fwd          front       93.7  157.3  63.8   50.8        2128
## 121         fwd          front       93.7  157.3  63.8   50.6        1967
## 122         fwd          front       93.7  167.3  63.8   50.8        1989
## 123         fwd          front       93.7  167.3  63.8   50.8        2191
## 124         fwd          front      103.3  174.6  64.6   59.8        2535
## 125         rwd          front       95.9  173.2  66.3   50.2        2818
## 126         rwd          front       94.5  168.9  68.3   50.2        2778
## 127         rwd           rear       89.5  168.9  65.0   51.6        2756
## 128         rwd           rear       89.5  168.9  65.0   51.6        2756
## 129         rwd           rear       89.5  168.9  65.0   51.6        2800
## 130         rwd          front       98.4  175.7  72.3   50.5        3366
## 131         fwd          front       96.1  181.5  66.5   55.2        2579
## 132         fwd          front       96.1  176.8  66.6   50.5        2460
## 133         fwd          front       99.1  186.6  66.5   56.1        2658
## 134         fwd          front       99.1  186.6  66.5   56.1        2695
## 135         fwd          front       99.1  186.6  66.5   56.1        2707
## 136         fwd          front       99.1  186.6  66.5   56.1        2758
## 137         fwd          front       99.1  186.6  66.5   56.1        2808
## 138         fwd          front       99.1  186.6  66.5   56.1        2847
## 139         fwd          front       93.7  156.9  63.4   53.7        2050
## 140         fwd          front       93.7  157.9  63.6   53.7        2120
## 141         4wd          front       93.3  157.3  63.8   55.7        2240
## 142         fwd          front       97.2  172.0  65.4   52.5        2145
## 143         fwd          front       97.2  172.0  65.4   52.5        2190
## 144         fwd          front       97.2  172.0  65.4   52.5        2340
## 145         4wd          front       97.0  172.0  65.4   54.3        2385
## 146         4wd          front       97.0  172.0  65.4   54.3        2510
## 147         fwd          front       97.0  173.5  65.4   53.0        2290
## 148         fwd          front       97.0  173.5  65.4   53.0        2455
## 149         4wd          front       96.9  173.6  65.4   54.9        2420
## 150         4wd          front       96.9  173.6  65.4   54.9        2650
## 151         fwd          front       95.7  158.7  63.6   54.5        1985
```

```
## 152         fwd         front       95.7  158.7  63.6   54.5        2040
## 153         fwd         front       95.7  158.7  63.6   54.5        2015
## 154         fwd         front       95.7  169.7  63.6   59.1        2280
## 155         4wd         front       95.7  169.7  63.6   59.1        2290
## 156         4wd         front       95.7  169.7  63.6   59.1        3110
## 157         fwd         front       95.7  166.3  64.4   53.0        2081
## 158         fwd         front       95.7  166.3  64.4   52.8        2109
## 159         fwd         front       95.7  166.3  64.4   53.0        2275
## 160         fwd         front       95.7  166.3  64.4   52.8        2275
## 161         fwd         front       95.7  166.3  64.4   53.0        2094
## 162         fwd         front       95.7  166.3  64.4   52.8        2122
## 163         fwd         front       95.7  166.3  64.4   52.8        2140
## 164         rwd         front       94.5  168.7  64.0   52.6        2169
## 165         rwd         front       94.5  168.7  64.0   52.6        2204
## 166         rwd         front       94.5  168.7  64.0   52.6        2265
## 167         rwd         front       94.5  168.7  64.0   52.6        2300
## 168         rwd         front       98.4  176.2  65.6   52.0        2540
## 169         rwd         front       98.4  176.2  65.6   52.0        2536
## 170         rwd         front       98.4  176.2  65.6   52.0        2551
## 171         rwd         front       98.4  176.2  65.6   52.0        2679
## 172         rwd         front       98.4  176.2  65.6   52.0        2714
## 173         rwd         front       98.4  176.2  65.6   53.0        2975
## 174         fwd         front      102.4  175.6  66.5   54.9        2326
## 175         fwd         front      102.4  175.6  66.5   54.9        2480
## 176         fwd         front      102.4  175.6  66.5   53.9        2414
## 177         fwd         front      102.4  175.6  66.5   54.9        2414
## 178         fwd         front      102.4  175.6  66.5   53.9        2458
## 179         rwd         front      102.9  183.5  67.7   52.0        2976
## 180         rwd         front      102.9  183.5  67.7   52.0        3016
## 181         rwd         front      104.5  187.8  66.5   54.1        3131
## 182         rwd         front      104.5  187.8  66.5   54.1        3151
## 183         fwd         front       97.3  171.7  65.5   55.7        2261
## 184         fwd         front       97.3  171.7  65.5   55.7        2209
## 185         fwd         front       97.3  171.7  65.5   55.7        2264
## 186         fwd         front       97.3  171.7  65.5   55.7        2212
## 187         fwd         front       97.3  171.7  65.5   55.7        2275
## 188         fwd         front       97.3  171.7  65.5   55.7        2319
## 189         fwd         front       97.3  171.7  65.5   55.7        2300
## 190         fwd         front       94.5  159.3  64.2   55.6        2254
## 191         fwd         front       94.5  165.7  64.0   51.4        2221
## 192         fwd         front      100.4  180.2  66.9   55.1        2661
## 193         fwd         front      100.4  180.2  66.9   55.1        2579
## 194         fwd         front      100.4  183.1  66.9   55.1        2563
## 195         rwd         front      104.3  188.8  67.2   56.2        2912
## 196         rwd         front      104.3  188.8  67.2   57.5        3034
## 197         rwd         front      104.3  188.8  67.2   56.2        2935
## 198         rwd         front      104.3  188.8  67.2   57.5        3042
## 199         rwd         front      104.3  188.8  67.2   56.2        3045
## 200         rwd         front      104.3  188.8  67.2   57.5        3157
## 201         rwd         front      109.1  188.8  68.9   55.5        2952
## 202         rwd         front      109.1  188.8  68.8   55.5        3049
## 203         rwd         front      109.1  188.8  68.9   55.5        3012
## 204         rwd         front      109.1  188.8  68.9   55.5        3217
## 205         rwd         front      109.1  188.8  68.9   55.5        3062
```

```
##     engineType nrCylinds engineSize fuelSystem     bore   stroke
## 1         dohc      four        130       mpfi 3.470000 2.680000
## 2         dohc      four        130       mpfi 3.470000 2.680000
## 3         ohcv       six        152       mpfi 2.680000 3.470000
## 4          ohc      four        109       mpfi 3.190000 3.400000
## 5          ohc      five        136       mpfi 3.190000 3.400000
## 6          ohc      five        136       mpfi 3.190000 3.400000
## 7          ohc      five        136       mpfi 3.190000 3.400000
## 8          ohc      five        136       mpfi 3.190000 3.400000
## 9          ohc      five        131       mpfi 3.130000 3.400000
## 10         ohc      five        131       mpfi 3.130000 3.400000
## 11         ohc      four        108       mpfi 3.500000 2.800000
## 12         ohc      four        108       mpfi 3.500000 2.800000
## 13         ohc       six        164       mpfi 3.310000 3.190000
## 14         ohc       six        164       mpfi 3.310000 3.190000
## 15         ohc       six        164       mpfi 3.310000 3.190000
## 16         ohc       six        209       mpfi 3.620000 3.390000
## 17         ohc       six        209       mpfi 3.620000 3.390000
## 18         ohc       six        209       mpfi 3.620000 3.390000
## 19           l     three         61       2bbl 2.910000 3.030000
## 20         ohc      four         90       2bbl 3.030000 3.110000
## 21         ohc      four         90       2bbl 3.030000 3.110000
## 22         ohc      four         90       2bbl 2.970000 3.230000
## 23         ohc      four         90       2bbl 2.970000 3.230000
## 24         ohc      four         98       mpfi 3.030000 3.390000
## 25         ohc      four         90       2bbl 2.970000 3.230000
## 26         ohc      four         90       2bbl 2.970000 3.230000
## 27         ohc      four         90       2bbl 2.970000 3.230000
## 28         ohc      four         98       mpfi 3.030000 3.390000
## 29         ohc      four        122       2bbl 3.340000 3.460000
## 30         ohc      four        156        mfi 3.600000 3.900000
## 31         ohc      four         92       1bbl 2.910000 3.410000
## 32         ohc      four         92       1bbl 2.910000 3.410000
## 33         ohc      four         79       1bbl 2.910000 3.070000
## 34         ohc      four         92       1bbl 2.910000 3.410000
## 35         ohc      four         92       1bbl 2.910000 3.410000
## 36         ohc      four         92       1bbl 2.910000 3.410000
## 37         ohc      four         92       1bbl 2.920000 3.410000
## 38         ohc      four        110       1bbl 3.150000 3.580000
## 39         ohc      four        110       1bbl 3.150000 3.580000
## 40         ohc      four        110       1bbl 3.150000 3.580000
## 41         ohc      four        110       1bbl 3.150000 3.580000
## 42         ohc      four        110       mpfi 3.150000 3.580000
## 43         ohc      four        110       2bbl 3.150000 3.580000
## 44         ohc      four        111       2bbl 3.310000 3.230000
## 45         ohc      four         90       2bbl 3.030000 3.110000
## 46         ohc      four         90       2bbl 3.030000 3.110000
## 47         ohc      four        119       spfi 3.430000 3.230000
## 48        dohc       six        258       mpfi 3.630000 4.170000
## 49        dohc       six        258       mpfi 3.630000 4.170000
## 50        ohcv    twelve        326       mpfi 3.540000 2.760000
## 51         ohc      four         91       2bbl 3.030000 3.150000
## 52         ohc      four         91       2bbl 3.030000 3.150000
## 53         ohc      four         91       2bbl 3.030000 3.150000
```

```
## 54         ohc      four         91       2bbl 3.030000 3.150000
## 55         ohc      four         91       2bbl 3.080000 3.150000
## 56       rotor       two         70       4bbl 3.329751 3.255423
## 57       rotor       two         70       4bbl 3.329751 3.255423
## 58       rotor       two         70       4bbl 3.329751 3.255423
## 59       rotor       two         80       mpfi 3.329751 3.255423
## 60         ohc      four        122       2bbl 3.390000 3.390000
## 61         ohc      four        122       2bbl 3.390000 3.390000
## 62         ohc      four        122       2bbl 3.390000 3.390000
## 63         ohc      four        122       2bbl 3.390000 3.390000
## 64         ohc      four        122        idi 3.390000 3.390000
## 65         ohc      four        122       2bbl 3.390000 3.390000
## 66         ohc      four        140       mpfi 3.760000 3.160000
## 67         ohc      four        134        idi 3.430000 3.640000
## 68         ohc      five        183        idi 3.580000 3.640000
## 69         ohc      five        183        idi 3.580000 3.640000
## 70         ohc      five        183        idi 3.580000 3.640000
## 71         ohc      five        183        idi 3.580000 3.640000
## 72        ohcv     eight        234       mpfi 3.460000 3.100000
## 73        ohcv     eight        234       mpfi 3.460000 3.100000
## 74        ohcv     eight        308       mpfi 3.800000 3.350000
## 75        ohcv     eight        304       mpfi 3.800000 3.350000
## 76         ohc      four        140       mpfi 3.780000 3.120000
## 77         ohc      four         92       2bbl 2.970000 3.230000
## 78         ohc      four         92       2bbl 2.970000 3.230000
## 79         ohc      four         92       2bbl 2.970000 3.230000
## 80         ohc      four         98       spdi 3.030000 3.390000
## 81         ohc      four        110       spdi 3.170000 3.460000
## 82         ohc      four        122       2bbl 3.350000 3.460000
## 83         ohc      four        156       spdi 3.580000 3.860000
## 84         ohc      four        156       spdi 3.590000 3.860000
## 85         ohc      four        156       spdi 3.590000 3.860000
## 86         ohc      four        122       2bbl 3.350000 3.460000
## 87         ohc      four        122       2bbl 3.350000 3.460000
## 88         ohc      four        110       spdi 3.170000 3.460000
## 89         ohc      four        110       spdi 3.170000 3.460000
## 90         ohc      four         97       2bbl 3.150000 3.290000
## 91         ohc      four        103        idi 2.990000 3.470000
## 92         ohc      four         97       2bbl 3.150000 3.290000
## 93         ohc      four         97       2bbl 3.150000 3.290000
## 94         ohc      four         97       2bbl 3.150000 3.290000
## 95         ohc      four         97       2bbl 3.150000 3.290000
## 96         ohc      four         97       2bbl 3.150000 3.290000
## 97         ohc      four         97       2bbl 3.150000 3.290000
## 98         ohc      four         97       2bbl 3.150000 3.290000
## 99         ohc      four         97       2bbl 3.150000 3.290000
## 100        ohc      four        120       2bbl 3.330000 3.470000
## 101        ohc      four        120       2bbl 3.330000 3.470000
## 102       ohcv       six        181       mpfi 3.430000 3.270000
## 103       ohcv       six        181       mpfi 3.430000 3.270000
## 104       ohcv       six        181       mpfi 3.430000 3.270000
## 105       ohcv       six        181       mpfi 3.430000 3.270000
## 106       ohcv       six        181       mpfi 3.430000 3.270000
## 107       ohcv       six        181       mpfi 3.430000 3.270000
```

```
## 108          l      four        120       mpfi 3.460000 3.190000
## 109          l      four        152        idi 3.700000 3.520000
## 110          l      four        120       mpfi 3.460000 3.190000
## 111          l      four        152        idi 3.700000 3.520000
## 112          l      four        120       mpfi 3.460000 2.190000
## 113          l      four        152        idi 3.700000 3.520000
## 114          l      four        120       mpfi 3.460000 2.190000
## 115          l      four        152        idi 3.700000 3.520000
## 116          l      four        120       mpfi 3.460000 3.190000
## 117          l      four        152        idi 3.700000 3.520000
## 118          l      four        134       mpfi 3.610000 3.210000
## 119        ohc      four         90       2bbl 2.970000 3.230000
## 120        ohc      four         98       spdi 3.030000 3.390000
## 121        ohc      four         90       2bbl 2.970000 3.230000
## 122        ohc      four         90       2bbl 2.970000 3.230000
## 123        ohc      four         98       2bbl 2.970000 3.230000
## 124        ohc      four        122       2bbl 3.350000 3.460000
## 125        ohc      four        156       spdi 3.590000 3.860000
## 126        ohc      four        151       mpfi 3.940000 3.110000
## 127       ohcf       six        194       mpfi 3.740000 2.900000
## 128       ohcf       six        194       mpfi 3.740000 2.900000
## 129       ohcf       six        194       mpfi 3.740000 2.900000
## 130      dohcv     eight        203       mpfi 3.940000 3.110000
## 131        ohc      four        132       mpfi 3.460000 3.900000
## 132        ohc      four        132       mpfi 3.460000 3.900000
## 133        ohc      four        121       mpfi 3.540000 3.070000
## 134        ohc      four        121       mpfi 3.540000 3.070000
## 135        ohc      four        121       mpfi 2.540000 2.070000
## 136        ohc      four        121       mpfi 3.540000 3.070000
## 137       dohc      four        121       mpfi 3.540000 3.070000
## 138       dohc      four        121       mpfi 3.540000 3.070000
## 139       ohcf      four         97       2bbl 3.620000 2.360000
## 140       ohcf      four        108       2bbl 3.620000 2.640000
## 141       ohcf      four        108       2bbl 3.620000 2.640000
## 142       ohcf      four        108       2bbl 3.620000 2.640000
## 143       ohcf      four        108       2bbl 3.620000 2.640000
## 144       ohcf      four        108       mpfi 3.620000 2.640000
## 145       ohcf      four        108       2bbl 3.620000 2.640000
## 146       ohcf      four        108       mpfi 3.620000 2.640000
## 147       ohcf      four        108       2bbl 3.620000 2.640000
## 148       ohcf      four        108       mpfi 3.620000 2.640000
## 149       ohcf      four        108       2bbl 3.620000 2.640000
## 150       ohcf      four        108       mpfi 3.620000 2.640000
## 151        ohc      four         92       2bbl 3.050000 3.030000
## 152        ohc      four         92       2bbl 3.050000 3.030000
## 153        ohc      four         92       2bbl 3.050000 3.030000
## 154        ohc      four         92       2bbl 3.050000 3.030000
## 155        ohc      four         92       2bbl 3.050000 3.030000
## 156        ohc      four         92       2bbl 3.050000 3.030000
## 157        ohc      four         98       2bbl 3.190000 3.030000
## 158        ohc      four         98       2bbl 3.190000 3.030000
## 159        ohc      four        110        idi 3.270000 3.350000
## 160        ohc      four        110        idi 3.270000 3.350000
## 161        ohc      four         98       2bbl 3.190000 3.030000
```

```
## 162        ohc      four         98       2bbl 3.190000 3.030000
## 163        ohc      four         98       2bbl 3.190000 3.030000
## 164        ohc      four         98       2bbl 3.190000 3.030000
## 165        ohc      four         98       2bbl 3.190000 3.030000
## 166       dohc      four         98       mpfi 3.240000 3.080000
## 167       dohc      four         98       mpfi 3.240000 3.080000
## 168        ohc      four        146       mpfi 3.620000 3.500000
## 169        ohc      four        146       mpfi 3.620000 3.500000
## 170        ohc      four        146       mpfi 3.620000 3.500000
## 171        ohc      four        146       mpfi 3.620000 3.500000
## 172        ohc      four        146       mpfi 3.620000 3.500000
## 173        ohc      four        146       mpfi 3.620000 3.500000
## 174        ohc      four        122       mpfi 3.310000 3.540000
## 175        ohc      four        110        idi 3.270000 3.350000
## 176        ohc      four        122       mpfi 3.310000 3.540000
## 177        ohc      four        122       mpfi 3.310000 3.540000
## 178        ohc      four        122       mpfi 3.310000 3.540000
## 179       dohc       six        171       mpfi 3.270000 3.350000
## 180       dohc       six        171       mpfi 3.270000 3.350000
## 181       dohc       six        171       mpfi 3.270000 3.350000
## 182       dohc       six        161       mpfi 3.270000 3.350000
## 183        ohc      four         97        idi 3.010000 3.400000
## 184        ohc      four        109       mpfi 3.190000 3.400000
## 185        ohc      four         97        idi 3.010000 3.400000
## 186        ohc      four        109       mpfi 3.190000 3.400000
## 187        ohc      four        109       mpfi 3.190000 3.400000
## 188        ohc      four         97        idi 3.010000 3.400000
## 189        ohc      four        109       mpfi 3.190000 3.400000
## 190        ohc      four        109       mpfi 3.190000 3.400000
## 191        ohc      four        109       mpfi 3.190000 3.400000
## 192        ohc      five        136       mpfi 3.190000 3.400000
## 193        ohc      four         97        idi 3.010000 3.400000
## 194        ohc      four        109       mpfi 3.190000 3.400000
## 195        ohc      four        141       mpfi 3.780000 3.150000
## 196        ohc      four        141       mpfi 3.780000 3.150000
## 197        ohc      four        141       mpfi 3.780000 3.150000
## 198        ohc      four        141       mpfi 3.780000 3.150000
## 199        ohc      four        130       mpfi 3.620000 3.150000
## 200        ohc      four        130       mpfi 3.620000 3.150000
## 201        ohc      four        141       mpfi 3.780000 3.150000
## 202        ohc      four        141       mpfi 3.780000 3.150000
## 203       ohcv       six        173       mpfi 3.580000 2.870000
## 204        ohc       six        145        idi 3.010000 3.400000
## 205        ohc      four        141       mpfi 3.780000 3.150000
##     compressionRatio horsePower peakRpm cityMpg highwayMpg price
## 1               9.00        111    5000      21         27 13495
## 2               9.00        111    5000      21         27 16500
## 3               9.00        154    5000      19         26 16500
## 4              10.00        102    5500      24         30 13950
## 5               8.00        115    5500      18         22 17450
## 6               8.50        110    5500      19         25 15250
## 7               8.50        110    5500      19         25 17710
## 8               8.50        110    5500      19         25 18920
## 9               8.30        140    5500      17         20 23875
```

```
## 10          7.00        160    5500      16          22    NA
## 11          8.80        101    5800      23          29 16430
## 12          8.80        101    5800      23          29 16925
## 13          9.00        121    4250      21          28 20970
## 14          9.00        121    4250      21          28 21105
## 15          9.00        121    4250      20          25 24565
## 16          8.00        182    5400      16          22 30760
## 17          8.00        182    5400      16          22 41315
## 18          8.00        182    5400      15          20 36880
## 19          9.50         48    5100      47          53  5151
## 20          9.60         70    5400      38          43  6295
## 21          9.60         70    5400      38          43  6575
## 22          9.41         68    5500      37          41  5572
## 23          9.40         68    5500      31          38  6377
## 24          7.60        102    5500      24          30  7957
## 25          9.40         68    5500      31          38  6229
## 26          9.40         68    5500      31          38  6692
## 27          9.40         68    5500      31          38  7609
## 28          7.60        102    5500      24          30  8558
## 29          8.50         88    5000      24          30  8921
## 30          7.00        145    5000      19          24 12964
## 31          9.60         58    4800      49          54  6479
## 32          9.20         76    6000      31          38  6855
## 33         10.10         60    5500      38          42  5399
## 34          9.20         76    6000      30          34  6529
## 35          9.20         76    6000      30          34  7129
## 36          9.20         76    6000      30          34  7295
## 37          9.20         76    6000      30          34  7295
## 38          9.00         86    5800      27          33  7895
## 39          9.00         86    5800      27          33  9095
## 40          9.00         86    5800      27          33  8845
## 41          9.00         86    5800      27          33 10295
## 42          9.00        101    5800      24          28 12945
## 43          9.10        100    5500      25          31 10345
## 44          8.50         78    4800      24          29  6785
## 45          9.60         70    5400      38          43    NA
## 46          9.60         70    5400      38          43    NA
## 47          9.20         90    5000      24          29 11048
## 48          8.10        176    4750      15          19 32250
## 49          8.10        176    4750      15          19 35550
## 50         11.50        262    5000      13          17 36000
## 51          9.00         68    5000      30          31  5195
## 52          9.00         68    5000      31          38  6095
## 53          9.00         68    5000      31          38  6795
## 54          9.00         68    5000      31          38  6695
## 55          9.00         68    5000      31          38  7395
## 56          9.40        101    6000      17          23 10945
## 57          9.40        101    6000      17          23 11845
## 58          9.40        101    6000      17          23 13645
## 59          9.40        135    6000      16          23 15645
## 60          8.60         84    4800      26          32  8845
## 61          8.60         84    4800      26          32  8495
## 62          8.60         84    4800      26          32 10595
## 63          8.60         84    4800      26          32 10245
```

```
## 64          22.70         64    4650      36          42 10795
## 65           8.60         84    4800      26          32 11245
## 66           8.00        120    5000      19          27 18280
## 67          22.00         72    4200      31          39 18344
## 68          21.50        123    4350      22          25 25552
## 69          21.50        123    4350      22          25 28248
## 70          21.50        123    4350      22          25 28176
## 71          21.50        123    4350      22          25 31600
## 72           8.30        155    4750      16          18 34184
## 73           8.30        155    4750      16          18 35056
## 74           8.00        184    4500      14          16 40960
## 75           8.00        184    4500      14          16 45400
## 76           8.00        175    5000      19          24 16503
## 77           9.40         68    5500      37          41  5389
## 78           9.40         68    5500      31          38  6189
## 79           9.40         68    5500      31          38  6669
## 80           7.60        102    5500      24          30  7689
## 81           7.50        116    5500      23          30  9959
## 82           8.50         88    5000      25          32  8499
## 83           7.00        145    5000      19          24 12629
## 84           7.00        145    5000      19          24 14869
## 85           7.00        145    5000      19          24 14489
## 86           8.50         88    5000      25          32  6989
## 87           8.50         88    5000      25          32  8189
## 88           7.50        116    5500      23          30  9279
## 89           7.50        116    5500      23          30  9279
## 90           9.40         69    5200      31          37  5499
## 91          21.90         55    4800      45          50  7099
## 92           9.40         69    5200      31          37  6649
## 93           9.40         69    5200      31          37  6849
## 94           9.40         69    5200      31          37  7349
## 95           9.40         69    5200      31          37  7299
## 96           9.40         69    5200      31          37  7799
## 97           9.40         69    5200      31          37  7499
## 98           9.40         69    5200      31          37  7999
## 99           9.40         69    5200      31          37  8249
## 100          8.50         97    5200      27          34  8949
## 101          8.50         97    5200      27          34  9549
## 102          9.00        152    5200      17          22 13499
## 103          9.00        152    5200      17          22 14399
## 104          9.00        152    5200      19          25 13499
## 105          9.00        160    5200      19          25 17199
## 106          7.80        200    5200      17          23 19699
## 107          9.00        160    5200      19          25 18399
## 108          8.40         97    5000      19          24 11900
## 109         21.00         95    4150      28          33 13200
## 110          8.40         97    5000      19          24 12440
## 111         21.00         95    4150      25          25 13860
## 112          8.40         95    5000      19          24 15580
## 113         21.00         95    4150      28          33 16900
## 114          8.40         95    5000      19          24 16695
## 115         21.00         95    4150      25          25 17075
## 116          8.40         97    5000      19          24 16630
## 117         21.00         95    4150      28          33 17950
```

```
## 118    7.00  142  5600  18  24 18150
## 119    9.40   68  5500  37  41  5572
## 120    7.60  102  5500  24  30  7957
## 121    9.40   68  5500  31  38  6229
## 122    9.40   68  5500  31  38  6692
## 123    9.40   68  5500  31  38  7609
## 124    8.50   88  5000  24  30  8921
## 125    7.00  145  5000  19  24 12764
## 126    9.50  143  5500  19  27 22018
## 127    9.50  207  5900  17  25 32528
## 128    9.50  207  5900  17  25 34028
## 129    9.50  207  5900  17  25 37028
## 130   10.00  288  5750  17  28    NA
## 131    8.70   NA    NA  23  31  9295
## 132    8.70   NA    NA  23  31  9895
## 133    9.31  110  5250  21  28 11850
## 134    9.30  110  5250  21  28 12170
## 135    9.30  110  5250  21  28 15040
## 136    9.30  110  5250  21  28 15510
## 137    9.00  160  5500  19  26 18150
## 138    9.00  160  5500  19  26 18620
## 139    9.00   69  4900  31  36  5118
## 140    8.70   73  4400  26  31  7053
## 141    8.70   73  4400  26  31  7603
## 142    9.50   82  4800  32  37  7126
## 143    9.50   82  4400  28  33  7775
## 144    9.00   94  5200  26  32  9960
## 145    9.00   82  4800  24  25  9233
## 146    7.70  111  4800  24  29 11259
## 147    9.00   82  4800  28  32  7463
## 148    9.00   94  5200  25  31 10198
## 149    9.00   82  4800  23  29  8013
## 150    7.70  111  4800  23  23 11694
## 151    9.00   62  4800  35  39  5348
## 152    9.00   62  4800  31  38  6338
## 153    9.00   62  4800  31  38  6488
## 154    9.00   62  4800  31  37  6918
## 155    9.00   62  4800  27  32  7898
## 156    9.00   62  4800  27  32  8778
## 157    9.00   70  4800  30  37  6938
## 158    9.00   70  4800  30  37  7198
## 159   22.50   56  4500  34  36  7898
## 160   22.50   56  4500  38  47  7788
## 161    9.00   70  4800  38  47  7738
## 162    9.00   70  4800  28  34  8358
## 163    9.00   70  4800  28  34  9258
## 164    9.00   70  4800  29  34  8058
## 165    9.00   70  4800  29  34  8238
## 166    9.40  112  6600  26  29  9298
## 167    9.40  112  6600  26  29  9538
## 168    9.30  116  4800  24  30  8449
## 169    9.30  116  4800  24  30  9639
## 170    9.30  116  4800  24  30  9989
## 171    9.30  116  4800  24  30 11199
```

```
## 172             9.30        116    4800      24          30 11549
## 173             9.30        116    4800      24          30 17669
## 174             8.70         92    4200      29          34  8948
## 175            22.50         73    4500      30          33 10698
## 176             8.70         92    4200      27          32  9988
## 177             8.70         92    4200      27          32 10898
## 178             8.70         92    4200      27          32 11248
## 179             9.30        161    5200      20          24 16558
## 180             9.30        161    5200      19          24 15998
## 181             9.20        156    5200      20          24 15690
## 182             9.20        156    5200      19          24 15750
## 183            23.00         52    4800      37          46  7775
## 184             9.00         85    5250      27          34  7975
## 185            23.00         52    4800      37          46  7995
## 186             9.00         85    5250      27          34  8195
## 187             9.00         85    5250      27          34  8495
## 188            23.00         68    4500      37          42  9495
## 189            10.00        100    5500      26          32  9995
## 190             8.50         90    5500      24          29 11595
## 191             8.50         90    5500      24          29  9980
## 192             8.50        110    5500      19          24 13295
## 193            23.00         68    4500      33          38 13845
## 194             9.00         88    5500      25          31 12290
## 195             9.50        114    5400      23          28 12940
## 196             9.50        114    5400      23          28 13415
## 197             9.50        114    5400      24          28 15985
## 198             9.50        114    5400      24          28 16515
## 199             7.50        162    5100      17          22 18420
## 200             7.50        162    5100      17          22 18950
## 201             9.50        114    5400      23          28 16845
## 202             8.70        160    5300      19          25 19045
## 203             8.80        134    5500      18          23 21485
## 204            23.00        106    4800      26          27 22470
## 205             9.50        114    5400      19          25 22625
```

(f) Cree un nuevo conjunto de datos ingresando la moda en todas las columnas que tienen valores de tipo entero.

```r
# Convertir el objeto en un dataframe
df <- as.data.frame(carIns)

# Función para calcular la moda
calculate_mode <- function(x) {
  mod <- as.data.frame(table(x))
  mod <- mod[which.max(mod$Freq), 1]
  return(mod)
}

# Calcula la Moda de las columnas numericas de un dataframe y reemplaza los valores NA por la moda corr
dataModa <- df %>%
  mutate(across(where(is.numeric), ~ ifelse(is.na(.), calculate_mode(.), .)))
# across selecciona las columnas que cumplen una determinada condicion, en nuestro caso las columnas nu
```

```r
# Imprime el nuevo conjunto de datos
print(dataModa)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      3       42   alfa-romero      gas        std    two convertible
## 2      3       42   alfa-romero      gas        std    two convertible
## 3      1       42   alfa-romero      gas        std    two   hatchback
## 4      2      164          audi      gas        std   four       sedan
## 5      2      164          audi      gas        std   four       sedan
## 6      2       42          audi      gas        std    two       sedan
## 7      1      158          audi      gas        std   four       sedan
## 8      1       42          audi      gas        std   four       wagon
## 9      1      158          audi      gas      turbo   four       sedan
## 10     0       42          audi      gas      turbo    two   hatchback
## 11     2      192           bmw      gas        std    two       sedan
## 12     0      192           bmw      gas        std   four       sedan
## 13     0      188           bmw      gas        std    two       sedan
## 14     0      188           bmw      gas        std   four       sedan
## 15     1       42           bmw      gas        std   four       sedan
## 16     0       42           bmw      gas        std   four       sedan
## 17     0       42           bmw      gas        std    two       sedan
## 18     0       42           bmw      gas        std   four       sedan
## 19     2      121     chevrolet      gas        std    two   hatchback
## 20     1       98     chevrolet      gas        std    two   hatchback
## 21     0       81     chevrolet      gas        std   four       sedan
## 22     1      118         dodge      gas        std    two   hatchback
## 23     1      118         dodge      gas        std    two   hatchback
## 24     1      118         dodge      gas      turbo    two   hatchback
## 25     1      148         dodge      gas        std   four   hatchback
## 26     1      148         dodge      gas        std   four       sedan
## 27     1      148         dodge      gas        std   four       sedan
## 28     1      148         dodge      gas      turbo   <NA>       sedan
## 29    -1      110         dodge      gas        std   four       wagon
## 30     3      145         dodge      gas      turbo    two   hatchback
## 31     2      137         honda      gas        std    two   hatchback
## 32     2      137         honda      gas        std    two   hatchback
## 33     1      101         honda      gas        std    two   hatchback
## 34     1      101         honda      gas        std    two   hatchback
## 35     1      101         honda      gas        std    two   hatchback
## 36     0      110         honda      gas        std   four       sedan
## 37     0       78         honda      gas        std   four       wagon
## 38     0      106         honda      gas        std    two   hatchback
## 39     0      106         honda      gas        std    two   hatchback
## 40     0       85         honda      gas        std   four       sedan
## 41     0       85         honda      gas        std   four       sedan
## 42     0       85         honda      gas        std   four       sedan
## 43     1      107         honda      gas        std    two       sedan
## 44     0       42         isuzu      gas        std   four       sedan
## 45     1       42         isuzu      gas        std    two       sedan
## 46     0       42         isuzu      gas        std   four       sedan
## 47     2       42         isuzu      gas        std    two   hatchback
## 48     0      145        jaguar      gas        std   four       sedan
## 49     0       42        jaguar      gas        std   four       sedan
## 50     0       42        jaguar      gas        std    two       sedan
```

```
## 51     1      104         mazda      gas        std    two   hatchback
## 52     1      104         mazda      gas        std    two   hatchback
## 53     1      104         mazda      gas        std    two   hatchback
## 54     1      113         mazda      gas        std   four       sedan
## 55     1      113         mazda      gas        std   four       sedan
## 56     3      150         mazda      gas        std    two   hatchback
## 57     3      150         mazda      gas        std    two   hatchback
## 58     3      150         mazda      gas        std    two   hatchback
## 59     3      150         mazda      gas        std    two   hatchback
## 60     1      129         mazda      gas        std    two   hatchback
## 61     0      115         mazda      gas        std   four       sedan
## 62     1      129         mazda      gas        std    two   hatchback
## 63     0      115         mazda      gas        std   four       sedan
## 64     0       42         mazda   diesel        std   <NA>       sedan
## 65     0      115         mazda      gas        std   four   hatchback
## 66     0      118         mazda      gas        std   four       sedan
## 67     0       42         mazda   diesel        std   four       sedan
## 68    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 69    -1       93 mercedes-benz   diesel      turbo   four       wagon
## 70     0       93 mercedes-benz   diesel      turbo    two     hardtop
## 71    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 72    -1       42 mercedes-benz      gas        std   four       sedan
## 73     3      142 mercedes-benz      gas        std    two convertible
## 74     0       42 mercedes-benz      gas        std   four       sedan
## 75     1       42 mercedes-benz      gas        std    two     hardtop
## 76     1       42       mercury      gas      turbo    two   hatchback
## 77     2      161    mitsubishi      gas        std    two   hatchback
## 78     2      161    mitsubishi      gas        std    two   hatchback
## 79     2      161    mitsubishi      gas        std    two   hatchback
## 80     1      161    mitsubishi      gas      turbo    two   hatchback
## 81     3      153    mitsubishi      gas      turbo    two   hatchback
## 82     3      153    mitsubishi      gas        std    two   hatchback
## 83     3       42    mitsubishi      gas      turbo    two   hatchback
## 84     3       42    mitsubishi      gas      turbo    two   hatchback
## 85     3       42    mitsubishi      gas      turbo    two   hatchback
## 86     1      125    mitsubishi      gas        std   four       sedan
## 87     1      125    mitsubishi      gas        std   four       sedan
## 88     1      125    mitsubishi      gas      turbo   four       sedan
## 89    -1      137    mitsubishi      gas        std   four       sedan
## 90     1      128        nissan      gas        std    two       sedan
## 91     1      128        nissan   diesel        std    two       sedan
## 92     1      128        nissan      gas        std    two       sedan
## 93     1      122        nissan      gas        std   four       sedan
## 94     1      103        nissan      gas        std   four       wagon
## 95     1      128        nissan      gas        std    two       sedan
## 96     1      128        nissan      gas        std    two   hatchback
## 97     1      122        nissan      gas        std   four       sedan
## 98     1      103        nissan      gas        std   four       wagon
## 99     2      168        nissan      gas        std    two     hardtop
## 100    0      106        nissan      gas        std   four   hatchback
## 101    0      106        nissan      gas        std   four       sedan
## 102    0      128        nissan      gas        std   four       sedan
## 103    0      108        nissan      gas        std   four       wagon
## 104    0      108        nissan      gas        std   four       sedan
```

```
## 105    3      194        nissan      gas        std    two   hatchback
## 106    3      194        nissan      gas      turbo    two   hatchback
## 107    1      231        nissan      gas        std    two   hatchback
## 108    0      161        peugot      gas        std   four       sedan
## 109    0      161        peugot   diesel      turbo   four       sedan
## 110    0       42        peugot      gas        std   four       wagon
## 111    0       42        peugot   diesel      turbo   four       wagon
## 112    0      161        peugot      gas        std   four       sedan
## 113    0      161        peugot   diesel      turbo   four       sedan
## 114    0       42        peugot      gas        std   four       wagon
## 115    0       42        peugot   diesel      turbo   four       wagon
## 116    0      161        peugot      gas        std   four       sedan
## 117    0      161        peugot   diesel      turbo   four       sedan
## 118    0      161        peugot      gas      turbo   four       sedan
## 119    1      119      plymouth      gas        std    two   hatchback
## 120    1      119      plymouth      gas      turbo    two   hatchback
## 121    1      154      plymouth      gas        std   four   hatchback
## 122    1      154      plymouth      gas        std   four       sedan
## 123    1      154      plymouth      gas        std   four       sedan
## 124   -1       74      plymouth      gas        std   four       wagon
## 125    3       42      plymouth      gas      turbo    two   hatchback
## 126    3      186       porsche      gas        std    two   hatchback
## 127    3       42       porsche      gas        std    two     hardtop
## 128    3       42       porsche      gas        std    two     hardtop
## 129    3       42       porsche      gas        std    two convertible
## 130    1       42       porsche      gas        std    two   hatchback
## 131    0       42       renault      gas        std   four       wagon
## 132    2       42       renault      gas        std    two   hatchback
## 133    3      150          saab      gas        std    two   hatchback
## 134    2      104          saab      gas        std   four       sedan
## 135    3      150          saab      gas        std    two   hatchback
## 136    2      104          saab      gas        std   four       sedan
## 137    3      150          saab      gas      turbo    two   hatchback
## 138    2      104          saab      gas      turbo   four       sedan
## 139    2       83        subaru      gas        std    two   hatchback
## 140    2       83        subaru      gas        std    two   hatchback
## 141    2       83        subaru      gas        std    two   hatchback
## 142    0      102        subaru      gas        std   four       sedan
## 143    0      102        subaru      gas        std   four       sedan
## 144    0      102        subaru      gas        std   four       sedan
## 145    0      102        subaru      gas        std   four       sedan
## 146    0      102        subaru      gas      turbo   four       sedan
## 147    0       89        subaru      gas        std   four       wagon
## 148    0       89        subaru      gas        std   four       wagon
## 149    0       85        subaru      gas        std   four       wagon
## 150    0       85        subaru      gas      turbo   four       wagon
## 151    1       87        toyota      gas        std    two   hatchback
## 152    1       87        toyota      gas        std    two   hatchback
## 153    1       74        toyota      gas        std   four   hatchback
## 154    0       77        toyota      gas        std   four       wagon
## 155    0       81        toyota      gas        std   four       wagon
## 156    0       91        toyota      gas        std   four       wagon
## 157    0       91        toyota      gas        std   four       sedan
## 158    0       91        toyota      gas        std   four   hatchback
```

```
## 159    0       91        toyota   diesel        std   four       sedan
## 160    0       91        toyota   diesel        std   four   hatchback
## 161    0       91        toyota      gas        std   four       sedan
## 162    0       91        toyota      gas        std   four   hatchback
## 163    0       91        toyota      gas        std   four       sedan
## 164    1      168        toyota      gas        std    two       sedan
## 165    1      168        toyota      gas        std    two   hatchback
## 166    1      168        toyota      gas        std    two       sedan
## 167    1      168        toyota      gas        std    two   hatchback
## 168    2      134        toyota      gas        std    two     hardtop
## 169    2      134        toyota      gas        std    two     hardtop
## 170    2      134        toyota      gas        std    two   hatchback
## 171    2      134        toyota      gas        std    two     hardtop
## 172    2      134        toyota      gas        std    two   hatchback
## 173    2      134        toyota      gas        std    two convertible
## 174   -1       65        toyota      gas        std   four       sedan
## 175   -1       65        toyota   diesel      turbo   four       sedan
## 176   -1       65        toyota      gas        std   four   hatchback
## 177   -1       65        toyota      gas        std   four       sedan
## 178   -1       65        toyota      gas        std   four   hatchback
## 179    3      197        toyota      gas        std    two   hatchback
## 180    3      197        toyota      gas        std    two   hatchback
## 181   -1       90        toyota      gas        std   four       sedan
## 182   -1       42        toyota      gas        std   four       wagon
## 183    2      122    volkswagen   diesel        std    two       sedan
## 184    2      122    volkswagen      gas        std    two       sedan
## 185    2       94    volkswagen   diesel        std   four       sedan
## 186    2       94    volkswagen      gas        std   four       sedan
## 187    2       94    volkswagen      gas        std   four       sedan
## 188    2       94    volkswagen   diesel      turbo   four       sedan
## 189    2       94    volkswagen      gas        std   four       sedan
## 190    3       42    volkswagen      gas        std    two convertible
## 191    3      256    volkswagen      gas        std    two   hatchback
## 192    0       42    volkswagen      gas        std   four       sedan
## 193    0       42    volkswagen   diesel      turbo   four       sedan
## 194    0       42    volkswagen      gas        std   four       wagon
## 195   -2      103         volvo      gas        std   four       sedan
## 196   -1       74         volvo      gas        std   four       wagon
## 197   -2      103         volvo      gas        std   four       sedan
## 198   -1       74         volvo      gas        std   four       wagon
## 199   -2      103         volvo      gas      turbo   four       sedan
## 200   -1       74         volvo      gas      turbo   four       wagon
## 201   -1       95         volvo      gas        std   four       sedan
## 202   -1       95         volvo      gas      turbo   four       sedan
## 203   -1       95         volvo      gas        std   four       sedan
## 204   -1       95         volvo   diesel      turbo   four       sedan
## 205   -1       95         volvo      gas      turbo   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           rwd          front      88.6  168.8  64.1   48.8       2548
## 2           rwd          front      88.6  168.8  64.1   48.8       2548
## 3           rwd          front      94.5  171.2  65.5   52.4       2823
## 4           fwd          front      99.8  176.6  66.2   54.3       2337
## 5           4wd          front      99.4  176.6  66.4   54.3       2824
## 6           fwd          front      99.8  177.3  66.3   53.1       2507
```

```
## 7          fwd         front     105.8  192.7  71.4   55.7       2844
## 8          fwd         front     105.8  192.7  71.4   55.7       2954
## 9          fwd         front     105.8  192.7  71.4   55.9       3086
## 10         4wd         front      99.5  178.2  67.9   52.0       3053
## 11         rwd         front     101.2  176.8  64.8   54.3       2395
## 12         rwd         front     101.2  176.8  64.8   54.3       2395
## 13         rwd         front     101.2  176.8  64.8   54.3       2710
## 14         rwd         front     101.2  176.8  64.8   54.3       2765
## 15         rwd         front     103.5  189.0  66.9   55.7       3055
## 16         rwd         front     103.5  189.0  66.9   55.7       3230
## 17         rwd         front     103.5  193.8  67.9   53.7       3380
## 18         rwd         front     110.0  197.0  70.9   56.3       3505
## 19         fwd         front      88.4  141.1  60.3   53.2       1488
## 20         fwd         front      94.5  155.9  63.6   52.0       1874
## 21         fwd         front      94.5  158.8  63.6   52.0       1909
## 22         fwd         front      93.7  157.3  63.8   50.8       1876
## 23         fwd         front      93.7  157.3  63.8   50.8       1876
## 24         fwd         front      93.7  157.3  63.8   50.8       2128
## 25         fwd         front      93.7  157.3  63.8   50.6       1967
## 26         fwd         front      93.7  157.3  63.8   50.6       1989
## 27         fwd         front      93.7  157.3  63.8   50.6       1989
## 28         fwd         front      93.7  157.3  63.8   50.6       2191
## 29         fwd         front     103.3  174.6  64.6   59.8       2535
## 30         fwd         front      95.9  173.2  66.3   50.2       2811
## 31         fwd         front      86.6  144.6  63.9   50.8       1713
## 32         fwd         front      86.6  144.6  63.9   50.8       1819
## 33         fwd         front      93.7  150.0  64.0   52.6       1837
## 34         fwd         front      93.7  150.0  64.0   52.6       1940
## 35         fwd         front      93.7  150.0  64.0   52.6       1956
## 36         fwd         front      96.5  163.4  64.0   54.5       2010
## 37         fwd         front      96.5  157.1  63.9   58.3       2024
## 38         fwd         front      96.5  167.5  65.2   53.3       2236
## 39         fwd         front      96.5  167.5  65.2   53.3       2289
## 40         fwd         front      96.5  175.4  65.2   54.1       2304
## 41         fwd         front      96.5  175.4  62.5   54.1       2372
## 42         fwd         front      96.5  175.4  65.2   54.1       2465
## 43         fwd         front      96.5  169.1  66.0   51.0       2293
## 44         rwd         front      94.3  170.7  61.8   53.5       2337
## 45         fwd         front      94.5  155.9  63.6   52.0       1874
## 46         fwd         front      94.5  155.9  63.6   52.0       1909
## 47         rwd         front      96.0  172.6  65.2   51.4       2734
## 48         rwd         front     113.0  199.6  69.6   52.8       4066
## 49         rwd         front     113.0  199.6  69.6   52.8       4066
## 50         rwd         front     102.0  191.7  70.6   47.8       3950
## 51         fwd         front      93.1  159.1  64.2   54.1       1890
## 52         fwd         front      93.1  159.1  64.2   54.1       1900
## 53         fwd         front      93.1  159.1  64.2   54.1       1905
## 54         fwd         front      93.1  166.8  64.2   54.1       1945
## 55         fwd         front      93.1  166.8  64.2   54.1       1950
## 56         rwd         front      95.3  169.0  65.7   49.6       2380
## 57         rwd         front      95.3  169.0  65.7   49.6       2380
## 58         rwd         front      95.3  169.0  65.7   49.6       2385
## 59         rwd         front      95.3  169.0  65.7   49.6       2500
## 60         fwd         front      98.8  177.8  66.5   53.7       2385
```

```
## 61          fwd          front       98.8  177.8  66.5   55.5        2410
## 62          fwd          front       98.8  177.8  66.5   53.7        2385
## 63          fwd          front       98.8  177.8  66.5   55.5        2410
## 64          fwd          front       98.8  177.8  66.5   55.5        2443
## 65          fwd          front       98.8  177.8  66.5   55.5        2425
## 66          rwd          front      104.9  175.0  66.1   54.4        2670
## 67          rwd          front      104.9  175.0  66.1   54.4        2700
## 68          rwd          front      110.0  190.9  70.3   56.5        3515
## 69          rwd          front      110.0  190.9  70.3   58.7        3750
## 70          rwd          front      106.7  187.5  70.3   54.9        3495
## 71          rwd          front      115.6  202.6  71.7   56.3        3770
## 72          rwd          front      115.6  202.6  71.7   56.5        3740
## 73          rwd          front       96.6  180.3  70.5   50.8        3685
## 74          rwd          front      120.9  208.1  71.7   56.7        3900
## 75          rwd          front      112.0  199.2  72.0   55.4        3715
## 76          rwd          front      102.7  178.4  68.0   54.8        2910
## 77          fwd          front       93.7  157.3  64.4   50.8        1918
## 78          fwd          front       93.7  157.3  64.4   50.8        1944
## 79          fwd          front       93.7  157.3  64.4   50.8        2004
## 80          fwd          front       93.0  157.3  63.8   50.8        2145
## 81          fwd          front       96.3  173.0  65.4   49.4        2370
## 82          fwd          front       96.3  173.0  65.4   49.4        2328
## 83          fwd          front       95.9  173.2  66.3   50.2        2833
## 84          fwd          front       95.9  173.2  66.3   50.2        2921
## 85          fwd          front       95.9  173.2  66.3   50.2        2926
## 86          fwd          front       96.3  172.4  65.4   51.6        2365
## 87          fwd          front       96.3  172.4  65.4   51.6        2405
## 88          fwd          front       96.3  172.4  65.4   51.6        2403
## 89          fwd          front       96.3  172.4  65.4   51.6        2403
## 90          fwd          front       94.5  165.3  63.8   54.5        1889
## 91          fwd          front       94.5  165.3  63.8   54.5        2017
## 92          fwd          front       94.5  165.3  63.8   54.5        1918
## 93          fwd          front       94.5  165.3  63.8   54.5        1938
## 94          fwd          front       94.5  170.2  63.8   53.5        2024
## 95          fwd          front       94.5  165.3  63.8   54.5        1951
## 96          fwd          front       94.5  165.6  63.8   53.3        2028
## 97          fwd          front       94.5  165.3  63.8   54.5        1971
## 98          fwd          front       94.5  170.2  63.8   53.5        2037
## 99          fwd          front       95.1  162.4  63.8   53.3        2008
## 100         fwd          front       97.2  173.4  65.2   54.7        2324
## 101         fwd          front       97.2  173.4  65.2   54.7        2302
## 102         fwd          front      100.4  181.7  66.5   55.1        3095
## 103         fwd          front      100.4  184.6  66.5   56.1        3296
## 104         fwd          front      100.4  184.6  66.5   55.1        3060
## 105         rwd          front       91.3  170.7  67.9   49.7        3071
## 106         rwd          front       91.3  170.7  67.9   49.7        3139
## 107         rwd          front       99.2  178.5  67.9   49.7        3139
## 108         rwd          front      107.9  186.7  68.4   56.7        3020
## 109         rwd          front      107.9  186.7  68.4   56.7        3197
## 110         rwd          front      114.2  198.9  68.4   58.7        3230
## 111         rwd          front      114.2  198.9  68.4   58.7        3430
## 112         rwd          front      107.9  186.7  68.4   56.7        3075
## 113         rwd          front      107.9  186.7  68.4   56.7        3252
## 114         rwd          front      114.2  198.9  68.4   56.7        3285
```

```
## 115         rwd          front     114.2  198.9  68.4   58.7        3485
## 116         rwd          front     107.9  186.7  68.4   56.7        3075
## 117         rwd          front     107.9  186.7  68.4   56.7        3252
## 118         rwd          front     108.0  186.7  68.3   56.0        3130
## 119         fwd          front      93.7  157.3  63.8   50.8        1918
## 120         fwd          front      93.7  157.3  63.8   50.8        2128
## 121         fwd          front      93.7  157.3  63.8   50.6        1967
## 122         fwd          front      93.7  167.3  63.8   50.8        1989
## 123         fwd          front      93.7  167.3  63.8   50.8        2191
## 124         fwd          front     103.3  174.6  64.6   59.8        2535
## 125         rwd          front      95.9  173.2  66.3   50.2        2818
## 126         rwd          front      94.5  168.9  68.3   50.2        2778
## 127         rwd           rear      89.5  168.9  65.0   51.6        2756
## 128         rwd           rear      89.5  168.9  65.0   51.6        2756
## 129         rwd           rear      89.5  168.9  65.0   51.6        2800
## 130         rwd          front      98.4  175.7  72.3   50.5        3366
## 131         fwd          front      96.1  181.5  66.5   55.2        2579
## 132         fwd          front      96.1  176.8  66.6   50.5        2460
## 133         fwd          front      99.1  186.6  66.5   56.1        2658
## 134         fwd          front      99.1  186.6  66.5   56.1        2695
## 135         fwd          front      99.1  186.6  66.5   56.1        2707
## 136         fwd          front      99.1  186.6  66.5   56.1        2758
## 137         fwd          front      99.1  186.6  66.5   56.1        2808
## 138         fwd          front      99.1  186.6  66.5   56.1        2847
## 139         fwd          front      93.7  156.9  63.4   53.7        2050
## 140         fwd          front      93.7  157.9  63.6   53.7        2120
## 141         4wd          front      93.3  157.3  63.8   55.7        2240
## 142         fwd          front      97.2  172.0  65.4   52.5        2145
## 143         fwd          front      97.2  172.0  65.4   52.5        2190
## 144         fwd          front      97.2  172.0  65.4   52.5        2340
## 145         4wd          front      97.0  172.0  65.4   54.3        2385
## 146         4wd          front      97.0  172.0  65.4   54.3        2510
## 147         fwd          front      97.0  173.5  65.4   53.0        2290
## 148         fwd          front      97.0  173.5  65.4   53.0        2455
## 149         4wd          front      96.9  173.6  65.4   54.9        2420
## 150         4wd          front      96.9  173.6  65.4   54.9        2650
## 151         fwd          front      95.7  158.7  63.6   54.5        1985
## 152         fwd          front      95.7  158.7  63.6   54.5        2040
## 153         fwd          front      95.7  158.7  63.6   54.5        2015
## 154         fwd          front      95.7  169.7  63.6   59.1        2280
## 155         4wd          front      95.7  169.7  63.6   59.1        2290
## 156         4wd          front      95.7  169.7  63.6   59.1        3110
## 157         fwd          front      95.7  166.3  64.4   53.0        2081
## 158         fwd          front      95.7  166.3  64.4   52.8        2109
## 159         fwd          front      95.7  166.3  64.4   53.0        2275
## 160         fwd          front      95.7  166.3  64.4   52.8        2275
## 161         fwd          front      95.7  166.3  64.4   53.0        2094
## 162         fwd          front      95.7  166.3  64.4   52.8        2122
## 163         fwd          front      95.7  166.3  64.4   52.8        2140
## 164         rwd          front      94.5  168.7  64.0   52.6        2169
## 165         rwd          front      94.5  168.7  64.0   52.6        2204
## 166         rwd          front      94.5  168.7  64.0   52.6        2265
## 167         rwd          front      94.5  168.7  64.0   52.6        2300
## 168         rwd          front      98.4  176.2  65.6   52.0        2540
```

```
## 169         rwd          front      98.4  176.2  65.6   52.0        2536
## 170         rwd          front      98.4  176.2  65.6   52.0        2551
## 171         rwd          front      98.4  176.2  65.6   52.0        2679
## 172         rwd          front      98.4  176.2  65.6   52.0        2714
## 173         rwd          front      98.4  176.2  65.6   53.0        2975
## 174         fwd          front     102.4  175.6  66.5   54.9        2326
## 175         fwd          front     102.4  175.6  66.5   54.9        2480
## 176         fwd          front     102.4  175.6  66.5   53.9        2414
## 177         fwd          front     102.4  175.6  66.5   54.9        2414
## 178         fwd          front     102.4  175.6  66.5   53.9        2458
## 179         rwd          front     102.9  183.5  67.7   52.0        2976
## 180         rwd          front     102.9  183.5  67.7   52.0        3016
## 181         rwd          front     104.5  187.8  66.5   54.1        3131
## 182         rwd          front     104.5  187.8  66.5   54.1        3151
## 183         fwd          front      97.3  171.7  65.5   55.7        2261
## 184         fwd          front      97.3  171.7  65.5   55.7        2209
## 185         fwd          front      97.3  171.7  65.5   55.7        2264
## 186         fwd          front      97.3  171.7  65.5   55.7        2212
## 187         fwd          front      97.3  171.7  65.5   55.7        2275
## 188         fwd          front      97.3  171.7  65.5   55.7        2319
## 189         fwd          front      97.3  171.7  65.5   55.7        2300
## 190         fwd          front      94.5  159.3  64.2   55.6        2254
## 191         fwd          front      94.5  165.7  64.0   51.4        2221
## 192         fwd          front     100.4  180.2  66.9   55.1        2661
## 193         fwd          front     100.4  180.2  66.9   55.1        2579
## 194         fwd          front     100.4  183.1  66.9   55.1        2563
## 195         rwd          front     104.3  188.8  67.2   56.2        2912
## 196         rwd          front     104.3  188.8  67.2   57.5        3034
## 197         rwd          front     104.3  188.8  67.2   56.2        2935
## 198         rwd          front     104.3  188.8  67.2   57.5        3042
## 199         rwd          front     104.3  188.8  67.2   56.2        3045
## 200         rwd          front     104.3  188.8  67.2   57.5        3157
## 201         rwd          front     109.1  188.8  68.9   55.5        2952
## 202         rwd          front     109.1  188.8  68.8   55.5        3049
## 203         rwd          front     109.1  188.8  68.9   55.5        3012
## 204         rwd          front     109.1  188.8  68.9   55.5        3217
## 205         rwd          front     109.1  188.8  68.9   55.5        3062
##     engineType nrCylinds engineSize fuelSystem  bore stroke compressionRatio
## 1         dohc      four        130       mpfi  3.47   2.68             9.00
## 2         dohc      four        130       mpfi  3.47   2.68             9.00
## 3         ohcv       six        152       mpfi  2.68   3.47             9.00
## 4          ohc      four        109       mpfi  3.19   3.40            10.00
## 5          ohc      five        136       mpfi  3.19   3.40             8.00
## 6          ohc      five        136       mpfi  3.19   3.40             8.50
## 7          ohc      five        136       mpfi  3.19   3.40             8.50
## 8          ohc      five        136       mpfi  3.19   3.40             8.50
## 9          ohc      five        131       mpfi  3.13   3.40             8.30
## 10         ohc      five        131       mpfi  3.13   3.40             7.00
## 11         ohc      four        108       mpfi  3.50   2.80             8.80
## 12         ohc      four        108       mpfi  3.50   2.80             8.80
## 13         ohc       six        164       mpfi  3.31   3.19             9.00
## 14         ohc       six        164       mpfi  3.31   3.19             9.00
## 15         ohc       six        164       mpfi  3.31   3.19             9.00
## 16         ohc       six        209       mpfi  3.62   3.39             8.00
```

```
## 17         ohc       six        209       mpfi  3.62   3.39            8.00
## 18         ohc       six        209       mpfi  3.62   3.39            8.00
## 19           l     three         61       2bbl  2.91   3.03            9.50
## 20         ohc      four         90       2bbl  3.03   3.11            9.60
## 21         ohc      four         90       2bbl  3.03   3.11            9.60
## 22         ohc      four         90       2bbl  2.97   3.23            9.41
## 23         ohc      four         90       2bbl  2.97   3.23            9.40
## 24         ohc      four         98       mpfi  3.03   3.39            7.60
## 25         ohc      four         90       2bbl  2.97   3.23            9.40
## 26         ohc      four         90       2bbl  2.97   3.23            9.40
## 27         ohc      four         90       2bbl  2.97   3.23            9.40
## 28         ohc      four         98       mpfi  3.03   3.39            7.60
## 29         ohc      four        122       2bbl  3.34   3.46            8.50
## 30         ohc      four        156        mfi  3.60   3.90            7.00
## 31         ohc      four         92       1bbl  2.91   3.41            9.60
## 32         ohc      four         92       1bbl  2.91   3.41            9.20
## 33         ohc      four         79       1bbl  2.91   3.07           10.10
## 34         ohc      four         92       1bbl  2.91   3.41            9.20
## 35         ohc      four         92       1bbl  2.91   3.41            9.20
## 36         ohc      four         92       1bbl  2.91   3.41            9.20
## 37         ohc      four         92       1bbl  2.92   3.41            9.20
## 38         ohc      four        110       1bbl  3.15   3.58            9.00
## 39         ohc      four        110       1bbl  3.15   3.58            9.00
## 40         ohc      four        110       1bbl  3.15   3.58            9.00
## 41         ohc      four        110       1bbl  3.15   3.58            9.00
## 42         ohc      four        110       mpfi  3.15   3.58            9.00
## 43         ohc      four        110       2bbl  3.15   3.58            9.10
## 44         ohc      four        111       2bbl  3.31   3.23            8.50
## 45         ohc      four         90       2bbl  3.03   3.11            9.60
## 46         ohc      four         90       2bbl  3.03   3.11            9.60
## 47         ohc      four        119       spfi  3.43   3.23            9.20
## 48        dohc       six        258       mpfi  3.63   4.17            8.10
## 49        dohc       six        258       mpfi  3.63   4.17            8.10
## 50        ohcv    twelve        326       mpfi  3.54   2.76           11.50
## 51         ohc      four         91       2bbl  3.03   3.15            9.00
## 52         ohc      four         91       2bbl  3.03   3.15            9.00
## 53         ohc      four         91       2bbl  3.03   3.15            9.00
## 54         ohc      four         91       2bbl  3.03   3.15            9.00
## 55         ohc      four         91       2bbl  3.08   3.15            9.00
## 56       rotor       two         70       4bbl 31.00  25.00            9.40
## 57       rotor       two         70       4bbl 31.00  25.00            9.40
## 58       rotor       two         70       4bbl 31.00  25.00            9.40
## 59       rotor       two         80       mpfi 31.00  25.00            9.40
## 60         ohc      four        122       2bbl  3.39   3.39            8.60
## 61         ohc      four        122       2bbl  3.39   3.39            8.60
## 62         ohc      four        122       2bbl  3.39   3.39            8.60
## 63         ohc      four        122       2bbl  3.39   3.39            8.60
## 64         ohc      four        122        idi  3.39   3.39           22.70
## 65         ohc      four        122       2bbl  3.39   3.39            8.60
## 66         ohc      four        140       mpfi  3.76   3.16            8.00
## 67         ohc      four        134        idi  3.43   3.64           22.00
## 68         ohc      five        183        idi  3.58   3.64           21.50
## 69         ohc      five        183        idi  3.58   3.64           21.50
## 70         ohc      five        183        idi  3.58   3.64           21.50
```

```
## 71        ohc      five        183        idi  3.58   3.64          21.50
## 72       ohcv     eight        234       mpfi  3.46   3.10           8.30
## 73       ohcv     eight        234       mpfi  3.46   3.10           8.30
## 74       ohcv     eight        308       mpfi  3.80   3.35           8.00
## 75       ohcv     eight        304       mpfi  3.80   3.35           8.00
## 76        ohc      four        140       mpfi  3.78   3.12           8.00
## 77        ohc      four         92       2bbl  2.97   3.23           9.40
## 78        ohc      four         92       2bbl  2.97   3.23           9.40
## 79        ohc      four         92       2bbl  2.97   3.23           9.40
## 80        ohc      four         98       spdi  3.03   3.39           7.60
## 81        ohc      four        110       spdi  3.17   3.46           7.50
## 82        ohc      four        122       2bbl  3.35   3.46           8.50
## 83        ohc      four        156       spdi  3.58   3.86           7.00
## 84        ohc      four        156       spdi  3.59   3.86           7.00
## 85        ohc      four        156       spdi  3.59   3.86           7.00
## 86        ohc      four        122       2bbl  3.35   3.46           8.50
## 87        ohc      four        122       2bbl  3.35   3.46           8.50
## 88        ohc      four        110       spdi  3.17   3.46           7.50
## 89        ohc      four        110       spdi  3.17   3.46           7.50
## 90        ohc      four         97       2bbl  3.15   3.29           9.40
## 91        ohc      four        103        idi  2.99   3.47          21.90
## 92        ohc      four         97       2bbl  3.15   3.29           9.40
## 93        ohc      four         97       2bbl  3.15   3.29           9.40
## 94        ohc      four         97       2bbl  3.15   3.29           9.40
## 95        ohc      four         97       2bbl  3.15   3.29           9.40
## 96        ohc      four         97       2bbl  3.15   3.29           9.40
## 97        ohc      four         97       2bbl  3.15   3.29           9.40
## 98        ohc      four         97       2bbl  3.15   3.29           9.40
## 99        ohc      four         97       2bbl  3.15   3.29           9.40
## 100       ohc      four        120       2bbl  3.33   3.47           8.50
## 101       ohc      four        120       2bbl  3.33   3.47           8.50
## 102      ohcv       six        181       mpfi  3.43   3.27           9.00
## 103      ohcv       six        181       mpfi  3.43   3.27           9.00
## 104      ohcv       six        181       mpfi  3.43   3.27           9.00
## 105      ohcv       six        181       mpfi  3.43   3.27           9.00
## 106      ohcv       six        181       mpfi  3.43   3.27           7.80
## 107      ohcv       six        181       mpfi  3.43   3.27           9.00
## 108         l      four        120       mpfi  3.46   3.19           8.40
## 109         l      four        152        idi  3.70   3.52          21.00
## 110         l      four        120       mpfi  3.46   3.19           8.40
## 111         l      four        152        idi  3.70   3.52          21.00
## 112         l      four        120       mpfi  3.46   2.19           8.40
## 113         l      four        152        idi  3.70   3.52          21.00
## 114         l      four        120       mpfi  3.46   2.19           8.40
## 115         l      four        152        idi  3.70   3.52          21.00
## 116         l      four        120       mpfi  3.46   3.19           8.40
## 117         l      four        152        idi  3.70   3.52          21.00
## 118         l      four        134       mpfi  3.61   3.21           7.00
## 119       ohc      four         90       2bbl  2.97   3.23           9.40
## 120       ohc      four         98       spdi  3.03   3.39           7.60
## 121       ohc      four         90       2bbl  2.97   3.23           9.40
## 122       ohc      four         90       2bbl  2.97   3.23           9.40
## 123       ohc      four         98       2bbl  2.97   3.23           9.40
## 124       ohc      four        122       2bbl  3.35   3.46           8.50
```

```
## 125        ohc      four        156       spdi  3.59   3.86            7.00
## 126        ohc      four        151       mpfi  3.94   3.11            9.50
## 127       ohcf       six        194       mpfi  3.74   2.90            9.50
## 128       ohcf       six        194       mpfi  3.74   2.90            9.50
## 129       ohcf       six        194       mpfi  3.74   2.90            9.50
## 130      dohcv     eight        203       mpfi  3.94   3.11           10.00
## 131        ohc      four        132       mpfi  3.46   3.90            8.70
## 132        ohc      four        132       mpfi  3.46   3.90            8.70
## 133        ohc      four        121       mpfi  3.54   3.07            9.31
## 134        ohc      four        121       mpfi  3.54   3.07            9.30
## 135        ohc      four        121       mpfi  2.54   2.07            9.30
## 136        ohc      four        121       mpfi  3.54   3.07            9.30
## 137       dohc      four        121       mpfi  3.54   3.07            9.00
## 138       dohc      four        121       mpfi  3.54   3.07            9.00
## 139       ohcf      four         97       2bbl  3.62   2.36            9.00
## 140       ohcf      four        108       2bbl  3.62   2.64            8.70
## 141       ohcf      four        108       2bbl  3.62   2.64            8.70
## 142       ohcf      four        108       2bbl  3.62   2.64            9.50
## 143       ohcf      four        108       2bbl  3.62   2.64            9.50
## 144       ohcf      four        108       mpfi  3.62   2.64            9.00
## 145       ohcf      four        108       2bbl  3.62   2.64            9.00
## 146       ohcf      four        108       mpfi  3.62   2.64            7.70
## 147       ohcf      four        108       2bbl  3.62   2.64            9.00
## 148       ohcf      four        108       mpfi  3.62   2.64            9.00
## 149       ohcf      four        108       2bbl  3.62   2.64            9.00
## 150       ohcf      four        108       mpfi  3.62   2.64            7.70
## 151        ohc      four         92       2bbl  3.05   3.03            9.00
## 152        ohc      four         92       2bbl  3.05   3.03            9.00
## 153        ohc      four         92       2bbl  3.05   3.03            9.00
## 154        ohc      four         92       2bbl  3.05   3.03            9.00
## 155        ohc      four         92       2bbl  3.05   3.03            9.00
## 156        ohc      four         92       2bbl  3.05   3.03            9.00
## 157        ohc      four         98       2bbl  3.19   3.03            9.00
## 158        ohc      four         98       2bbl  3.19   3.03            9.00
## 159        ohc      four        110        idi  3.27   3.35           22.50
## 160        ohc      four        110        idi  3.27   3.35           22.50
## 161        ohc      four         98       2bbl  3.19   3.03            9.00
## 162        ohc      four         98       2bbl  3.19   3.03            9.00
## 163        ohc      four         98       2bbl  3.19   3.03            9.00
## 164        ohc      four         98       2bbl  3.19   3.03            9.00
## 165        ohc      four         98       2bbl  3.19   3.03            9.00
## 166       dohc      four         98       mpfi  3.24   3.08            9.40
## 167       dohc      four         98       mpfi  3.24   3.08            9.40
## 168        ohc      four        146       mpfi  3.62   3.50            9.30
## 169        ohc      four        146       mpfi  3.62   3.50            9.30
## 170        ohc      four        146       mpfi  3.62   3.50            9.30
## 171        ohc      four        146       mpfi  3.62   3.50            9.30
## 172        ohc      four        146       mpfi  3.62   3.50            9.30
## 173        ohc      four        146       mpfi  3.62   3.50            9.30
## 174        ohc      four        122       mpfi  3.31   3.54            8.70
## 175        ohc      four        110        idi  3.27   3.35           22.50
## 176        ohc      four        122       mpfi  3.31   3.54            8.70
## 177        ohc      four        122       mpfi  3.31   3.54            8.70
## 178        ohc      four        122       mpfi  3.31   3.54            8.70
```

```
## 179       dohc       six        171       mpfi  3.27   3.35             9.30
## 180       dohc       six        171       mpfi  3.27   3.35             9.30
## 181       dohc       six        171       mpfi  3.27   3.35             9.20
## 182       dohc       six        161       mpfi  3.27   3.35             9.20
## 183        ohc      four         97        idi  3.01   3.40            23.00
## 184        ohc      four        109       mpfi  3.19   3.40             9.00
## 185        ohc      four         97        idi  3.01   3.40            23.00
## 186        ohc      four        109       mpfi  3.19   3.40             9.00
## 187        ohc      four        109       mpfi  3.19   3.40             9.00
## 188        ohc      four         97        idi  3.01   3.40            23.00
## 189        ohc      four        109       mpfi  3.19   3.40            10.00
## 190        ohc      four        109       mpfi  3.19   3.40             8.50
## 191        ohc      four        109       mpfi  3.19   3.40             8.50
## 192        ohc      five        136       mpfi  3.19   3.40             8.50
## 193        ohc      four         97        idi  3.01   3.40            23.00
## 194        ohc      four        109       mpfi  3.19   3.40             9.00
## 195        ohc      four        141       mpfi  3.78   3.15             9.50
## 196        ohc      four        141       mpfi  3.78   3.15             9.50
## 197        ohc      four        141       mpfi  3.78   3.15             9.50
## 198        ohc      four        141       mpfi  3.78   3.15             9.50
## 199        ohc      four        130       mpfi  3.62   3.15             7.50
## 200        ohc      four        130       mpfi  3.62   3.15             7.50
## 201        ohc      four        141       mpfi  3.78   3.15             9.50
## 202        ohc      four        141       mpfi  3.78   3.15             8.70
## 203       ohcv       six        173       mpfi  3.58   2.87             8.80
## 204        ohc       six        145        idi  3.01   3.40            23.00
## 205        ohc      four        141       mpfi  3.78   3.15             9.50
##     horsePower peakRpm cityMpg highwayMpg price
## 1          111    5000      21         27 13495
## 2          111    5000      21         27 16500
## 3          154    5000      19         26 16500
## 4          102    5500      24         30 13950
## 5          115    5500      18         22 17450
## 6          110    5500      19         25 15250
## 7          110    5500      19         25 17710
## 8          110    5500      19         25 18920
## 9          140    5500      17         20 23875
## 10         160    5500      16         22     8
## 11         101    5800      23         29 16430
## 12         101    5800      23         29 16925
## 13         121    4250      21         28 20970
## 14         121    4250      21         28 21105
## 15         121    4250      20         25 24565
## 16         182    5400      16         22 30760
## 17         182    5400      16         22 41315
## 18         182    5400      15         20 36880
## 19          48    5100      47         53  5151
## 20          70    5400      38         43  6295
## 21          70    5400      38         43  6575
## 22          68    5500      37         41  5572
## 23          68    5500      31         38  6377
## 24         102    5500      24         30  7957
## 25          68    5500      31         38  6229
## 26          68    5500      31         38  6692
```

```
## 27          68    5500       31          38  7609
## 28         102    5500       24          30  8558
## 29          88    5000       24          30  8921
## 30         145    5000       19          24 12964
## 31          58    4800       49          54  6479
## 32          76    6000       31          38  6855
## 33          60    5500       38          42  5399
## 34          76    6000       30          34  6529
## 35          76    6000       30          34  7129
## 36          76    6000       30          34  7295
## 37          76    6000       30          34  7295
## 38          86    5800       27          33  7895
## 39          86    5800       27          33  9095
## 40          86    5800       27          33  8845
## 41          86    5800       27          33 10295
## 42         101    5800       24          28 12945
## 43         100    5500       25          31 10345
## 44          78    4800       24          29  6785
## 45          70    5400       38          43     8
## 46          70    5400       38          43     8
## 47          90    5000       24          29 11048
## 48         176    4750       15          19 32250
## 49         176    4750       15          19 35550
## 50         262    5000       13          17 36000
## 51          68    5000       30          31  5195
## 52          68    5000       31          38  6095
## 53          68    5000       31          38  6795
## 54          68    5000       31          38  6695
## 55          68    5000       31          38  7395
## 56         101    6000       17          23 10945
## 57         101    6000       17          23 11845
## 58         101    6000       17          23 13645
## 59         135    6000       16          23 15645
## 60          84    4800       26          32  8845
## 61          84    4800       26          32  8495
## 62          84    4800       26          32 10595
## 63          84    4800       26          32 10245
## 64          64    4650       36          42 10795
## 65          84    4800       26          32 11245
## 66         120    5000       19          27 18280
## 67          72    4200       31          39 18344
## 68         123    4350       22          25 25552
## 69         123    4350       22          25 28248
## 70         123    4350       22          25 28176
## 71         123    4350       22          25 31600
## 72         155    4750       16          18 34184
## 73         155    4750       16          18 35056
## 74         184    4500       14          16 40960
## 75         184    4500       14          16 45400
## 76         175    5000       19          24 16503
## 77          68    5500       37          41  5389
## 78          68    5500       31          38  6189
## 79          68    5500       31          38  6669
## 80         102    5500       24          30  7689
```

```
## 81         116    5500       23         30  9959
## 82          88    5000       25         32  8499
## 83         145    5000       19         24 12629
## 84         145    5000       19         24 14869
## 85         145    5000       19         24 14489
## 86          88    5000       25         32  6989
## 87          88    5000       25         32  8189
## 88         116    5500       23         30  9279
## 89         116    5500       23         30  9279
## 90          69    5200       31         37  5499
## 91          55    4800       45         50  7099
## 92          69    5200       31         37  6649
## 93          69    5200       31         37  6849
## 94          69    5200       31         37  7349
## 95          69    5200       31         37  7299
## 96          69    5200       31         37  7799
## 97          69    5200       31         37  7499
## 98          69    5200       31         37  7999
## 99          69    5200       31         37  8249
## 100         97    5200       27         34  8949
## 101         97    5200       27         34  9549
## 102        152    5200       17         22 13499
## 103        152    5200       17         22 14399
## 104        152    5200       19         25 13499
## 105        160    5200       19         25 17199
## 106        200    5200       17         23 19699
## 107        160    5200       19         25 18399
## 108         97    5000       19         24 11900
## 109         95    4150       28         33 13200
## 110         97    5000       19         24 12440
## 111         95    4150       25         25 13860
## 112         95    5000       19         24 15580
## 113         95    4150       28         33 16900
## 114         95    5000       19         24 16695
## 115         95    4150       25         25 17075
## 116         97    5000       19         24 16630
## 117         95    4150       28         33 17950
## 118        142    5600       18         24 18150
## 119         68    5500       37         41  5572
## 120        102    5500       24         30  7957
## 121         68    5500       31         38  6229
## 122         68    5500       31         38  6692
## 123         68    5500       31         38  7609
## 124         88    5000       24         30  8921
## 125        145    5000       19         24 12764
## 126        143    5500       19         27 22018
## 127        207    5900       17         25 32528
## 128        207    5900       17         25 34028
## 129        207    5900       17         25 37028
## 130        288    5750       17         28     8
## 131          9      17       23         31  9295
## 132          9      17       23         31  9895
## 133        110    5250       21         28 11850
## 134        110    5250       21         28 12170
```

```
## 135        110    5250       21         28 15040
## 136        110    5250       21         28 15510
## 137        160    5500       19         26 18150
## 138        160    5500       19         26 18620
## 139         69    4900       31         36  5118
## 140         73    4400       26         31  7053
## 141         73    4400       26         31  7603
## 142         82    4800       32         37  7126
## 143         82    4400       28         33  7775
## 144         94    5200       26         32  9960
## 145         82    4800       24         25  9233
## 146        111    4800       24         29 11259
## 147         82    4800       28         32  7463
## 148         94    5200       25         31 10198
## 149         82    4800       23         29  8013
## 150        111    4800       23         23 11694
## 151         62    4800       35         39  5348
## 152         62    4800       31         38  6338
## 153         62    4800       31         38  6488
## 154         62    4800       31         37  6918
## 155         62    4800       27         32  7898
## 156         62    4800       27         32  8778
## 157         70    4800       30         37  6938
## 158         70    4800       30         37  7198
## 159         56    4500       34         36  7898
## 160         56    4500       38         47  7788
## 161         70    4800       38         47  7738
## 162         70    4800       28         34  8358
## 163         70    4800       28         34  9258
## 164         70    4800       29         34  8058
## 165         70    4800       29         34  8238
## 166        112    6600       26         29  9298
## 167        112    6600       26         29  9538
## 168        116    4800       24         30  8449
## 169        116    4800       24         30  9639
## 170        116    4800       24         30  9989
## 171        116    4800       24         30 11199
## 172        116    4800       24         30 11549
## 173        116    4800       24         30 17669
## 174         92    4200       29         34  8948
## 175         73    4500       30         33 10698
## 176         92    4200       27         32  9988
## 177         92    4200       27         32 10898
## 178         92    4200       27         32 11248
## 179        161    5200       20         24 16558
## 180        161    5200       19         24 15998
## 181        156    5200       20         24 15690
## 182        156    5200       19         24 15750
## 183         52    4800       37         46  7775
## 184         85    5250       27         34  7975
## 185         52    4800       37         46  7995
## 186         85    5250       27         34  8195
## 187         85    5250       27         34  8495
## 188         68    4500       37         42  9495
```

```
## 189        100    5500      26         32  9995
## 190         90    5500      24         29 11595
## 191         90    5500      24         29  9980
## 192        110    5500      19         24 13295
## 193         68    4500      33         38 13845
## 194         88    5500      25         31 12290
## 195        114    5400      23         28 12940
## 196        114    5400      23         28 13415
## 197        114    5400      24         28 15985
## 198        114    5400      24         28 16515
## 199        162    5100      17         22 18420
## 200        162    5100      17         22 18950
## 201        114    5400      23         28 16845
## 202        160    5300      19         25 19045
## 203        134    5500      18         23 21485
## 204        106    4800      26         27 22470
## 205        114    5400      19         25 22625
```

(g) Cree un nuevo conjunto de datos imputando el valor más frecuente a la columna "nDoors". Sugerencia: utilice la función impute_replace()

```r
# Crea una copia del dataframe cargado
dfValFrecuente <- df

# Calcula la moda de la columna "nDoors"
modaNdoors <- calculate_mode(dfValFrecuente$nDoors)

# Reemplaza los valores NA de la columna nDoors con la moda calculada
dfValFrecuente <- dfValFrecuente %>%
  mutate(nDoors = replace_na(nDoors, modaNdoors))

# Imprime el nuevo dataframe
print(dfValFrecuente)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      3       NA   alfa-romero      gas        std    two convertible
## 2      3       NA   alfa-romero      gas        std    two convertible
## 3      1       NA   alfa-romero      gas        std    two   hatchback
## 4      2      164          audi      gas        std   four       sedan
## 5      2      164          audi      gas        std   four       sedan
## 6      2       NA          audi      gas        std    two       sedan
## 7      1      158          audi      gas        std   four       sedan
## 8      1       NA          audi      gas        std   four       wagon
## 9      1      158          audi      gas      turbo   four       sedan
## 10     0       NA          audi      gas      turbo    two   hatchback
## 11     2      192           bmw      gas        std    two       sedan
## 12     0      192           bmw      gas        std   four       sedan
## 13     0      188           bmw      gas        std    two       sedan
## 14     0      188           bmw      gas        std   four       sedan
## 15     1       NA           bmw      gas        std   four       sedan
## 16     0       NA           bmw      gas        std   four       sedan
## 17     0       NA           bmw      gas        std    two       sedan
## 18     0       NA           bmw      gas        std   four       sedan
## 19     2      121     chevrolet      gas        std    two   hatchback
```

```
## 20     1       98     chevrolet      gas        std    two   hatchback
## 21     0       81     chevrolet      gas        std   four       sedan
## 22     1      118         dodge      gas        std    two   hatchback
## 23     1      118         dodge      gas        std    two   hatchback
## 24     1      118         dodge      gas      turbo    two   hatchback
## 25     1      148         dodge      gas        std   four   hatchback
## 26     1      148         dodge      gas        std   four       sedan
## 27     1      148         dodge      gas        std   four       sedan
## 28     1      148         dodge      gas      turbo   four       sedan
## 29    -1      110         dodge      gas        std   four       wagon
## 30     3      145         dodge      gas      turbo    two   hatchback
## 31     2      137         honda      gas        std    two   hatchback
## 32     2      137         honda      gas        std    two   hatchback
## 33     1      101         honda      gas        std    two   hatchback
## 34     1      101         honda      gas        std    two   hatchback
## 35     1      101         honda      gas        std    two   hatchback
## 36     0      110         honda      gas        std   four       sedan
## 37     0       78         honda      gas        std   four       wagon
## 38     0      106         honda      gas        std    two   hatchback
## 39     0      106         honda      gas        std    two   hatchback
## 40     0       85         honda      gas        std   four       sedan
## 41     0       85         honda      gas        std   four       sedan
## 42     0       85         honda      gas        std   four       sedan
## 43     1      107         honda      gas        std    two       sedan
## 44     0       NA         isuzu      gas        std   four       sedan
## 45     1       NA         isuzu      gas        std    two       sedan
## 46     0       NA         isuzu      gas        std   four       sedan
## 47     2       NA         isuzu      gas        std    two   hatchback
## 48     0      145        jaguar      gas        std   four       sedan
## 49     0       NA        jaguar      gas        std   four       sedan
## 50     0       NA        jaguar      gas        std    two       sedan
## 51     1      104         mazda      gas        std    two   hatchback
## 52     1      104         mazda      gas        std    two   hatchback
## 53     1      104         mazda      gas        std    two   hatchback
## 54     1      113         mazda      gas        std   four       sedan
## 55     1      113         mazda      gas        std   four       sedan
## 56     3      150         mazda      gas        std    two   hatchback
## 57     3      150         mazda      gas        std    two   hatchback
## 58     3      150         mazda      gas        std    two   hatchback
## 59     3      150         mazda      gas        std    two   hatchback
## 60     1      129         mazda      gas        std    two   hatchback
## 61     0      115         mazda      gas        std   four       sedan
## 62     1      129         mazda      gas        std    two   hatchback
## 63     0      115         mazda      gas        std   four       sedan
## 64     0       NA         mazda   diesel        std   four       sedan
## 65     0      115         mazda      gas        std   four   hatchback
## 66     0      118         mazda      gas        std   four       sedan
## 67     0       NA         mazda   diesel        std   four       sedan
## 68    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 69    -1       93 mercedes-benz   diesel      turbo   four       wagon
## 70     0       93 mercedes-benz   diesel      turbo    two     hardtop
## 71    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 72    -1       NA mercedes-benz      gas        std   four       sedan
## 73     3      142 mercedes-benz      gas        std    two convertible
```

```
## 74     0       NA mercedes-benz      gas        std   four       sedan
## 75     1       NA mercedes-benz      gas        std    two     hardtop
## 76     1       NA       mercury      gas      turbo    two   hatchback
## 77     2      161    mitsubishi      gas        std    two   hatchback
## 78     2      161    mitsubishi      gas        std    two   hatchback
## 79     2      161    mitsubishi      gas        std    two   hatchback
## 80     1      161    mitsubishi      gas      turbo    two   hatchback
## 81     3      153    mitsubishi      gas      turbo    two   hatchback
## 82     3      153    mitsubishi      gas        std    two   hatchback
## 83     3       NA    mitsubishi      gas      turbo    two   hatchback
## 84     3       NA    mitsubishi      gas      turbo    two   hatchback
## 85     3       NA    mitsubishi      gas      turbo    two   hatchback
## 86     1      125    mitsubishi      gas        std   four       sedan
## 87     1      125    mitsubishi      gas        std   four       sedan
## 88     1      125    mitsubishi      gas      turbo   four       sedan
## 89    -1      137    mitsubishi      gas        std   four       sedan
## 90     1      128        nissan      gas        std    two       sedan
## 91     1      128        nissan   diesel        std    two       sedan
## 92     1      128        nissan      gas        std    two       sedan
## 93     1      122        nissan      gas        std   four       sedan
## 94     1      103        nissan      gas        std   four       wagon
## 95     1      128        nissan      gas        std    two       sedan
## 96     1      128        nissan      gas        std    two   hatchback
## 97     1      122        nissan      gas        std   four       sedan
## 98     1      103        nissan      gas        std   four       wagon
## 99     2      168        nissan      gas        std    two     hardtop
## 100    0      106        nissan      gas        std   four   hatchback
## 101    0      106        nissan      gas        std   four       sedan
## 102    0      128        nissan      gas        std   four       sedan
## 103    0      108        nissan      gas        std   four       wagon
## 104    0      108        nissan      gas        std   four       sedan
## 105    3      194        nissan      gas        std    two   hatchback
## 106    3      194        nissan      gas      turbo    two   hatchback
## 107    1      231        nissan      gas        std    two   hatchback
## 108    0      161        peugot      gas        std   four       sedan
## 109    0      161        peugot   diesel      turbo   four       sedan
## 110    0       NA        peugot      gas        std   four       wagon
## 111    0       NA        peugot   diesel      turbo   four       wagon
## 112    0      161        peugot      gas        std   four       sedan
## 113    0      161        peugot   diesel      turbo   four       sedan
## 114    0       NA        peugot      gas        std   four       wagon
## 115    0       NA        peugot   diesel      turbo   four       wagon
## 116    0      161        peugot      gas        std   four       sedan
## 117    0      161        peugot   diesel      turbo   four       sedan
## 118    0      161        peugot      gas      turbo   four       sedan
## 119    1      119      plymouth      gas        std    two   hatchback
## 120    1      119      plymouth      gas      turbo    two   hatchback
## 121    1      154      plymouth      gas        std   four   hatchback
## 122    1      154      plymouth      gas        std   four       sedan
## 123    1      154      plymouth      gas        std   four       sedan
## 124   -1       74      plymouth      gas        std   four       wagon
## 125    3       NA      plymouth      gas      turbo    two   hatchback
## 126    3      186       porsche      gas        std    two   hatchback
## 127    3       NA       porsche      gas        std    two     hardtop
```

```
## 128    3       NA       porsche      gas        std    two     hardtop
## 129    3       NA       porsche      gas        std    two convertible
## 130    1       NA       porsche      gas        std    two   hatchback
## 131    0       NA       renault      gas        std   four       wagon
## 132    2       NA       renault      gas        std    two   hatchback
## 133    3      150          saab      gas        std    two   hatchback
## 134    2      104          saab      gas        std   four       sedan
## 135    3      150          saab      gas        std    two   hatchback
## 136    2      104          saab      gas        std   four       sedan
## 137    3      150          saab      gas      turbo    two   hatchback
## 138    2      104          saab      gas      turbo   four       sedan
## 139    2       83        subaru      gas        std    two   hatchback
## 140    2       83        subaru      gas        std    two   hatchback
## 141    2       83        subaru      gas        std    two   hatchback
## 142    0      102        subaru      gas        std   four       sedan
## 143    0      102        subaru      gas        std   four       sedan
## 144    0      102        subaru      gas        std   four       sedan
## 145    0      102        subaru      gas        std   four       sedan
## 146    0      102        subaru      gas      turbo   four       sedan
## 147    0       89        subaru      gas        std   four       wagon
## 148    0       89        subaru      gas        std   four       wagon
## 149    0       85        subaru      gas        std   four       wagon
## 150    0       85        subaru      gas      turbo   four       wagon
## 151    1       87        toyota      gas        std    two   hatchback
## 152    1       87        toyota      gas        std    two   hatchback
## 153    1       74        toyota      gas        std   four   hatchback
## 154    0       77        toyota      gas        std   four       wagon
## 155    0       81        toyota      gas        std   four       wagon
## 156    0       91        toyota      gas        std   four       wagon
## 157    0       91        toyota      gas        std   four       sedan
## 158    0       91        toyota      gas        std   four   hatchback
## 159    0       91        toyota   diesel        std   four       sedan
## 160    0       91        toyota   diesel        std   four   hatchback
## 161    0       91        toyota      gas        std   four       sedan
## 162    0       91        toyota      gas        std   four   hatchback
## 163    0       91        toyota      gas        std   four       sedan
## 164    1      168        toyota      gas        std    two       sedan
## 165    1      168        toyota      gas        std    two   hatchback
## 166    1      168        toyota      gas        std    two       sedan
## 167    1      168        toyota      gas        std    two   hatchback
## 168    2      134        toyota      gas        std    two     hardtop
## 169    2      134        toyota      gas        std    two     hardtop
## 170    2      134        toyota      gas        std    two   hatchback
## 171    2      134        toyota      gas        std    two     hardtop
## 172    2      134        toyota      gas        std    two   hatchback
## 173    2      134        toyota      gas        std    two convertible
## 174   -1       65        toyota      gas        std   four       sedan
## 175   -1       65        toyota   diesel      turbo   four       sedan
## 176   -1       65        toyota      gas        std   four   hatchback
## 177   -1       65        toyota      gas        std   four       sedan
## 178   -1       65        toyota      gas        std   four   hatchback
## 179    3      197        toyota      gas        std    two   hatchback
## 180    3      197        toyota      gas        std    two   hatchback
## 181   -1       90        toyota      gas        std   four       sedan
```

```
## 182   -1       NA        toyota      gas        std   four       wagon
## 183    2      122    volkswagen   diesel        std    two       sedan
## 184    2      122    volkswagen      gas        std    two       sedan
## 185    2       94    volkswagen   diesel        std   four       sedan
## 186    2       94    volkswagen      gas        std   four       sedan
## 187    2       94    volkswagen      gas        std   four       sedan
## 188    2       94    volkswagen   diesel      turbo   four       sedan
## 189    2       94    volkswagen      gas        std   four       sedan
## 190    3       NA    volkswagen      gas        std    two convertible
## 191    3      256    volkswagen      gas        std    two   hatchback
## 192    0       NA    volkswagen      gas        std   four       sedan
## 193    0       NA    volkswagen   diesel      turbo   four       sedan
## 194    0       NA    volkswagen      gas        std   four       wagon
## 195   -2      103         volvo      gas        std   four       sedan
## 196   -1       74         volvo      gas        std   four       wagon
## 197   -2      103         volvo      gas        std   four       sedan
## 198   -1       74         volvo      gas        std   four       wagon
## 199   -2      103         volvo      gas      turbo   four       sedan
## 200   -1       74         volvo      gas      turbo   four       wagon
## 201   -1       95         volvo      gas        std   four       sedan
## 202   -1       95         volvo      gas      turbo   four       sedan
## 203   -1       95         volvo      gas        std   four       sedan
## 204   -1       95         volvo   diesel      turbo   four       sedan
## 205   -1       95         volvo      gas      turbo   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           rwd          front      88.6  168.8  64.1   48.8       2548
## 2           rwd          front      88.6  168.8  64.1   48.8       2548
## 3           rwd          front      94.5  171.2  65.5   52.4       2823
## 4           fwd          front      99.8  176.6  66.2   54.3       2337
## 5           4wd          front      99.4  176.6  66.4   54.3       2824
## 6           fwd          front      99.8  177.3  66.3   53.1       2507
## 7           fwd          front     105.8  192.7  71.4   55.7       2844
## 8           fwd          front     105.8  192.7  71.4   55.7       2954
## 9           fwd          front     105.8  192.7  71.4   55.9       3086
## 10          4wd          front      99.5  178.2  67.9   52.0       3053
## 11          rwd          front     101.2  176.8  64.8   54.3       2395
## 12          rwd          front     101.2  176.8  64.8   54.3       2395
## 13          rwd          front     101.2  176.8  64.8   54.3       2710
## 14          rwd          front     101.2  176.8  64.8   54.3       2765
## 15          rwd          front     103.5  189.0  66.9   55.7       3055
## 16          rwd          front     103.5  189.0  66.9   55.7       3230
## 17          rwd          front     103.5  193.8  67.9   53.7       3380
## 18          rwd          front     110.0  197.0  70.9   56.3       3505
## 19          fwd          front      88.4  141.1  60.3   53.2       1488
## 20          fwd          front      94.5  155.9  63.6   52.0       1874
## 21          fwd          front      94.5  158.8  63.6   52.0       1909
## 22          fwd          front      93.7  157.3  63.8   50.8       1876
## 23          fwd          front      93.7  157.3  63.8   50.8       1876
## 24          fwd          front      93.7  157.3  63.8   50.8       2128
## 25          fwd          front      93.7  157.3  63.8   50.6       1967
## 26          fwd          front      93.7  157.3  63.8   50.6       1989
## 27          fwd          front      93.7  157.3  63.8   50.6       1989
## 28          fwd          front      93.7  157.3  63.8   50.6       2191
## 29          fwd          front     103.3  174.6  64.6   59.8       2535
```

```
## 30          fwd          front       95.9  173.2  66.3   50.2        2811
## 31          fwd          front       86.6  144.6  63.9   50.8        1713
## 32          fwd          front       86.6  144.6  63.9   50.8        1819
## 33          fwd          front       93.7  150.0  64.0   52.6        1837
## 34          fwd          front       93.7  150.0  64.0   52.6        1940
## 35          fwd          front       93.7  150.0  64.0   52.6        1956
## 36          fwd          front       96.5  163.4  64.0   54.5        2010
## 37          fwd          front       96.5  157.1  63.9   58.3        2024
## 38          fwd          front       96.5  167.5  65.2   53.3        2236
## 39          fwd          front       96.5  167.5  65.2   53.3        2289
## 40          fwd          front       96.5  175.4  65.2   54.1        2304
## 41          fwd          front       96.5  175.4  62.5   54.1        2372
## 42          fwd          front       96.5  175.4  65.2   54.1        2465
## 43          fwd          front       96.5  169.1  66.0   51.0        2293
## 44          rwd          front       94.3  170.7  61.8   53.5        2337
## 45          fwd          front       94.5  155.9  63.6   52.0        1874
## 46          fwd          front       94.5  155.9  63.6   52.0        1909
## 47          rwd          front       96.0  172.6  65.2   51.4        2734
## 48          rwd          front      113.0  199.6  69.6   52.8        4066
## 49          rwd          front      113.0  199.6  69.6   52.8        4066
## 50          rwd          front      102.0  191.7  70.6   47.8        3950
## 51          fwd          front       93.1  159.1  64.2   54.1        1890
## 52          fwd          front       93.1  159.1  64.2   54.1        1900
## 53          fwd          front       93.1  159.1  64.2   54.1        1905
## 54          fwd          front       93.1  166.8  64.2   54.1        1945
## 55          fwd          front       93.1  166.8  64.2   54.1        1950
## 56          rwd          front       95.3  169.0  65.7   49.6        2380
## 57          rwd          front       95.3  169.0  65.7   49.6        2380
## 58          rwd          front       95.3  169.0  65.7   49.6        2385
## 59          rwd          front       95.3  169.0  65.7   49.6        2500
## 60          fwd          front       98.8  177.8  66.5   53.7        2385
## 61          fwd          front       98.8  177.8  66.5   55.5        2410
## 62          fwd          front       98.8  177.8  66.5   53.7        2385
## 63          fwd          front       98.8  177.8  66.5   55.5        2410
## 64          fwd          front       98.8  177.8  66.5   55.5        2443
## 65          fwd          front       98.8  177.8  66.5   55.5        2425
## 66          rwd          front      104.9  175.0  66.1   54.4        2670
## 67          rwd          front      104.9  175.0  66.1   54.4        2700
## 68          rwd          front      110.0  190.9  70.3   56.5        3515
## 69          rwd          front      110.0  190.9  70.3   58.7        3750
## 70          rwd          front      106.7  187.5  70.3   54.9        3495
## 71          rwd          front      115.6  202.6  71.7   56.3        3770
## 72          rwd          front      115.6  202.6  71.7   56.5        3740
## 73          rwd          front       96.6  180.3  70.5   50.8        3685
## 74          rwd          front      120.9  208.1  71.7   56.7        3900
## 75          rwd          front      112.0  199.2  72.0   55.4        3715
## 76          rwd          front      102.7  178.4  68.0   54.8        2910
## 77          fwd          front       93.7  157.3  64.4   50.8        1918
## 78          fwd          front       93.7  157.3  64.4   50.8        1944
## 79          fwd          front       93.7  157.3  64.4   50.8        2004
## 80          fwd          front       93.0  157.3  63.8   50.8        2145
## 81          fwd          front       96.3  173.0  65.4   49.4        2370
## 82          fwd          front       96.3  173.0  65.4   49.4        2328
## 83          fwd          front       95.9  173.2  66.3   50.2        2833
```

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## 84          fwd         front      95.9  173.2  66.3   50.2       2921
## 85          fwd         front      95.9  173.2  66.3   50.2       2926
## 86          fwd         front      96.3  172.4  65.4   51.6       2365
## 87          fwd         front      96.3  172.4  65.4   51.6       2405
## 88          fwd         front      96.3  172.4  65.4   51.6       2403
## 89          fwd         front      96.3  172.4  65.4   51.6       2403
## 90          fwd         front      94.5  165.3  63.8   54.5       1889
## 91          fwd         front      94.5  165.3  63.8   54.5       2017
## 92          fwd         front      94.5  165.3  63.8   54.5       1918
## 93          fwd         front      94.5  165.3  63.8   54.5       1938
## 94          fwd         front      94.5  170.2  63.8   53.5       2024
## 95          fwd         front      94.5  165.3  63.8   54.5       1951
## 96          fwd         front      94.5  165.6  63.8   53.3       2028
## 97          fwd         front      94.5  165.3  63.8   54.5       1971
## 98          fwd         front      94.5  170.2  63.8   53.5       2037
## 99          fwd         front      95.1  162.4  63.8   53.3       2008
## 100         fwd         front      97.2  173.4  65.2   54.7       2324
## 101         fwd         front      97.2  173.4  65.2   54.7       2302
## 102         fwd         front     100.4  181.7  66.5   55.1       3095
## 103         fwd         front     100.4  184.6  66.5   56.1       3296
## 104         fwd         front     100.4  184.6  66.5   55.1       3060
## 105         rwd         front      91.3  170.7  67.9   49.7       3071
## 106         rwd         front      91.3  170.7  67.9   49.7       3139
## 107         rwd         front      99.2  178.5  67.9   49.7       3139
## 108         rwd         front     107.9  186.7  68.4   56.7       3020
## 109         rwd         front     107.9  186.7  68.4   56.7       3197
## 110         rwd         front     114.2  198.9  68.4   58.7       3230
## 111         rwd         front     114.2  198.9  68.4   58.7       3430
## 112         rwd         front     107.9  186.7  68.4   56.7       3075
## 113         rwd         front     107.9  186.7  68.4   56.7       3252
## 114         rwd         front     114.2  198.9  68.4   56.7       3285
## 115         rwd         front     114.2  198.9  68.4   58.7       3485
## 116         rwd         front     107.9  186.7  68.4   56.7       3075
## 117         rwd         front     107.9  186.7  68.4   56.7       3252
## 118         rwd         front     108.0  186.7  68.3   56.0       3130
## 119         fwd         front      93.7  157.3  63.8   50.8       1918
## 120         fwd         front      93.7  157.3  63.8   50.8       2128
## 121         fwd         front      93.7  157.3  63.8   50.6       1967
## 122         fwd         front      93.7  167.3  63.8   50.8       1989
## 123         fwd         front      93.7  167.3  63.8   50.8       2191
## 124         fwd         front     103.3  174.6  64.6   59.8       2535
## 125         rwd         front      95.9  173.2  66.3   50.2       2818
## 126         rwd         front      94.5  168.9  68.3   50.2       2778
## 127         rwd          rear      89.5  168.9  65.0   51.6       2756
## 128         rwd          rear      89.5  168.9  65.0   51.6       2756
## 129         rwd          rear      89.5  168.9  65.0   51.6       2800
## 130         rwd         front      98.4  175.7  72.3   50.5       3366
## 131         fwd         front      96.1  181.5  66.5   55.2       2579
## 132         fwd         front      96.1  176.8  66.6   50.5       2460
## 133         fwd         front      99.1  186.6  66.5   56.1       2658
## 134         fwd         front      99.1  186.6  66.5   56.1       2695
## 135         fwd         front      99.1  186.6  66.5   56.1       2707
## 136         fwd         front      99.1  186.6  66.5   56.1       2758
## 137         fwd         front      99.1  186.6  66.5   56.1       2808
```

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## 138         fwd         front       99.1  186.6  66.5   56.1        2847
## 139         fwd         front       93.7  156.9  63.4   53.7        2050
## 140         fwd         front       93.7  157.9  63.6   53.7        2120
## 141         4wd         front       93.3  157.3  63.8   55.7        2240
## 142         fwd         front       97.2  172.0  65.4   52.5        2145
## 143         fwd         front       97.2  172.0  65.4   52.5        2190
## 144         fwd         front       97.2  172.0  65.4   52.5        2340
## 145         4wd         front       97.0  172.0  65.4   54.3        2385
## 146         4wd         front       97.0  172.0  65.4   54.3        2510
## 147         fwd         front       97.0  173.5  65.4   53.0        2290
## 148         fwd         front       97.0  173.5  65.4   53.0        2455
## 149         4wd         front       96.9  173.6  65.4   54.9        2420
## 150         4wd         front       96.9  173.6  65.4   54.9        2650
## 151         fwd         front       95.7  158.7  63.6   54.5        1985
## 152         fwd         front       95.7  158.7  63.6   54.5        2040
## 153         fwd         front       95.7  158.7  63.6   54.5        2015
## 154         fwd         front       95.7  169.7  63.6   59.1        2280
## 155         4wd         front       95.7  169.7  63.6   59.1        2290
## 156         4wd         front       95.7  169.7  63.6   59.1        3110
## 157         fwd         front       95.7  166.3  64.4   53.0        2081
## 158         fwd         front       95.7  166.3  64.4   52.8        2109
## 159         fwd         front       95.7  166.3  64.4   53.0        2275
## 160         fwd         front       95.7  166.3  64.4   52.8        2275
## 161         fwd         front       95.7  166.3  64.4   53.0        2094
## 162         fwd         front       95.7  166.3  64.4   52.8        2122
## 163         fwd         front       95.7  166.3  64.4   52.8        2140
## 164         rwd         front       94.5  168.7  64.0   52.6        2169
## 165         rwd         front       94.5  168.7  64.0   52.6        2204
## 166         rwd         front       94.5  168.7  64.0   52.6        2265
## 167         rwd         front       94.5  168.7  64.0   52.6        2300
## 168         rwd         front       98.4  176.2  65.6   52.0        2540
## 169         rwd         front       98.4  176.2  65.6   52.0        2536
## 170         rwd         front       98.4  176.2  65.6   52.0        2551
## 171         rwd         front       98.4  176.2  65.6   52.0        2679
## 172         rwd         front       98.4  176.2  65.6   52.0        2714
## 173         rwd         front       98.4  176.2  65.6   53.0        2975
## 174         fwd         front      102.4  175.6  66.5   54.9        2326
## 175         fwd         front      102.4  175.6  66.5   54.9        2480
## 176         fwd         front      102.4  175.6  66.5   53.9        2414
## 177         fwd         front      102.4  175.6  66.5   54.9        2414
## 178         fwd         front      102.4  175.6  66.5   53.9        2458
## 179         rwd         front      102.9  183.5  67.7   52.0        2976
## 180         rwd         front      102.9  183.5  67.7   52.0        3016
## 181         rwd         front      104.5  187.8  66.5   54.1        3131
## 182         rwd         front      104.5  187.8  66.5   54.1        3151
## 183         fwd         front       97.3  171.7  65.5   55.7        2261
## 184         fwd         front       97.3  171.7  65.5   55.7        2209
## 185         fwd         front       97.3  171.7  65.5   55.7        2264
## 186         fwd         front       97.3  171.7  65.5   55.7        2212
## 187         fwd         front       97.3  171.7  65.5   55.7        2275
## 188         fwd         front       97.3  171.7  65.5   55.7        2319
## 189         fwd         front       97.3  171.7  65.5   55.7        2300
## 190         fwd         front       94.5  159.3  64.2   55.6        2254
## 191         fwd         front       94.5  165.7  64.0   51.4        2221
```

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## 192         fwd          front     100.4  180.2  66.9   55.1       2661
## 193         fwd          front     100.4  180.2  66.9   55.1       2579
## 194         fwd          front     100.4  183.1  66.9   55.1       2563
## 195         rwd          front     104.3  188.8  67.2   56.2       2912
## 196         rwd          front     104.3  188.8  67.2   57.5       3034
## 197         rwd          front     104.3  188.8  67.2   56.2       2935
## 198         rwd          front     104.3  188.8  67.2   57.5       3042
## 199         rwd          front     104.3  188.8  67.2   56.2       3045
## 200         rwd          front     104.3  188.8  67.2   57.5       3157
## 201         rwd          front     109.1  188.8  68.9   55.5       2952
## 202         rwd          front     109.1  188.8  68.8   55.5       3049
## 203         rwd          front     109.1  188.8  68.9   55.5       3012
## 204         rwd          front     109.1  188.8  68.9   55.5       3217
## 205         rwd          front     109.1  188.8  68.9   55.5       3062
##     engineType nrCylinds engineSize fuelSystem bore stroke compressionRatio
## 1         dohc      four        130       mpfi 3.47   2.68             9.00
## 2         dohc      four        130       mpfi 3.47   2.68             9.00
## 3         ohcv       six        152       mpfi 2.68   3.47             9.00
## 4          ohc      four        109       mpfi 3.19   3.40            10.00
## 5          ohc      five        136       mpfi 3.19   3.40             8.00
## 6          ohc      five        136       mpfi 3.19   3.40             8.50
## 7          ohc      five        136       mpfi 3.19   3.40             8.50
## 8          ohc      five        136       mpfi 3.19   3.40             8.50
## 9          ohc      five        131       mpfi 3.13   3.40             8.30
## 10         ohc      five        131       mpfi 3.13   3.40             7.00
## 11         ohc      four        108       mpfi 3.50   2.80             8.80
## 12         ohc      four        108       mpfi 3.50   2.80             8.80
## 13         ohc       six        164       mpfi 3.31   3.19             9.00
## 14         ohc       six        164       mpfi 3.31   3.19             9.00
## 15         ohc       six        164       mpfi 3.31   3.19             9.00
## 16         ohc       six        209       mpfi 3.62   3.39             8.00
## 17         ohc       six        209       mpfi 3.62   3.39             8.00
## 18         ohc       six        209       mpfi 3.62   3.39             8.00
## 19           l     three         61       2bbl 2.91   3.03             9.50
## 20         ohc      four         90       2bbl 3.03   3.11             9.60
## 21         ohc      four         90       2bbl 3.03   3.11             9.60
## 22         ohc      four         90       2bbl 2.97   3.23             9.41
## 23         ohc      four         90       2bbl 2.97   3.23             9.40
## 24         ohc      four         98       mpfi 3.03   3.39             7.60
## 25         ohc      four         90       2bbl 2.97   3.23             9.40
## 26         ohc      four         90       2bbl 2.97   3.23             9.40
## 27         ohc      four         90       2bbl 2.97   3.23             9.40
## 28         ohc      four         98       mpfi 3.03   3.39             7.60
## 29         ohc      four        122       2bbl 3.34   3.46             8.50
## 30         ohc      four        156        mfi 3.60   3.90             7.00
## 31         ohc      four         92       1bbl 2.91   3.41             9.60
## 32         ohc      four         92       1bbl 2.91   3.41             9.20
## 33         ohc      four         79       1bbl 2.91   3.07            10.10
## 34         ohc      four         92       1bbl 2.91   3.41             9.20
## 35         ohc      four         92       1bbl 2.91   3.41             9.20
## 36         ohc      four         92       1bbl 2.91   3.41             9.20
## 37         ohc      four         92       1bbl 2.92   3.41             9.20
## 38         ohc      four        110       1bbl 3.15   3.58             9.00
## 39         ohc      four        110       1bbl 3.15   3.58             9.00
```

```
## 40         ohc      four        110       1bbl 3.15   3.58            9.00
## 41         ohc      four        110       1bbl 3.15   3.58            9.00
## 42         ohc      four        110       mpfi 3.15   3.58            9.00
## 43         ohc      four        110       2bbl 3.15   3.58            9.10
## 44         ohc      four        111       2bbl 3.31   3.23            8.50
## 45         ohc      four         90       2bbl 3.03   3.11            9.60
## 46         ohc      four         90       2bbl 3.03   3.11            9.60
## 47         ohc      four        119       spfi 3.43   3.23            9.20
## 48        dohc       six        258       mpfi 3.63   4.17            8.10
## 49        dohc       six        258       mpfi 3.63   4.17            8.10
## 50        ohcv    twelve        326       mpfi 3.54   2.76           11.50
## 51         ohc      four         91       2bbl 3.03   3.15            9.00
## 52         ohc      four         91       2bbl 3.03   3.15            9.00
## 53         ohc      four         91       2bbl 3.03   3.15            9.00
## 54         ohc      four         91       2bbl 3.03   3.15            9.00
## 55         ohc      four         91       2bbl 3.08   3.15            9.00
## 56       rotor       two         70       4bbl   NA     NA            9.40
## 57       rotor       two         70       4bbl   NA     NA            9.40
## 58       rotor       two         70       4bbl   NA     NA            9.40
## 59       rotor       two         80       mpfi   NA     NA            9.40
## 60         ohc      four        122       2bbl 3.39   3.39            8.60
## 61         ohc      four        122       2bbl 3.39   3.39            8.60
## 62         ohc      four        122       2bbl 3.39   3.39            8.60
## 63         ohc      four        122       2bbl 3.39   3.39            8.60
## 64         ohc      four        122        idi 3.39   3.39           22.70
## 65         ohc      four        122       2bbl 3.39   3.39            8.60
## 66         ohc      four        140       mpfi 3.76   3.16            8.00
## 67         ohc      four        134        idi 3.43   3.64           22.00
## 68         ohc      five        183        idi 3.58   3.64           21.50
## 69         ohc      five        183        idi 3.58   3.64           21.50
## 70         ohc      five        183        idi 3.58   3.64           21.50
## 71         ohc      five        183        idi 3.58   3.64           21.50
## 72        ohcv     eight        234       mpfi 3.46   3.10            8.30
## 73        ohcv     eight        234       mpfi 3.46   3.10            8.30
## 74        ohcv     eight        308       mpfi 3.80   3.35            8.00
## 75        ohcv     eight        304       mpfi 3.80   3.35            8.00
## 76         ohc      four        140       mpfi 3.78   3.12            8.00
## 77         ohc      four         92       2bbl 2.97   3.23            9.40
## 78         ohc      four         92       2bbl 2.97   3.23            9.40
## 79         ohc      four         92       2bbl 2.97   3.23            9.40
## 80         ohc      four         98       spdi 3.03   3.39            7.60
## 81         ohc      four        110       spdi 3.17   3.46            7.50
## 82         ohc      four        122       2bbl 3.35   3.46            8.50
## 83         ohc      four        156       spdi 3.58   3.86            7.00
## 84         ohc      four        156       spdi 3.59   3.86            7.00
## 85         ohc      four        156       spdi 3.59   3.86            7.00
## 86         ohc      four        122       2bbl 3.35   3.46            8.50
## 87         ohc      four        122       2bbl 3.35   3.46            8.50
## 88         ohc      four        110       spdi 3.17   3.46            7.50
## 89         ohc      four        110       spdi 3.17   3.46            7.50
## 90         ohc      four         97       2bbl 3.15   3.29            9.40
## 91         ohc      four        103        idi 2.99   3.47           21.90
## 92         ohc      four         97       2bbl 3.15   3.29            9.40
## 93         ohc      four         97       2bbl 3.15   3.29            9.40
```

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## 94         ohc      four         97       2bbl 3.15   3.29            9.40
## 95         ohc      four         97       2bbl 3.15   3.29            9.40
## 96         ohc      four         97       2bbl 3.15   3.29            9.40
## 97         ohc      four         97       2bbl 3.15   3.29            9.40
## 98         ohc      four         97       2bbl 3.15   3.29            9.40
## 99         ohc      four         97       2bbl 3.15   3.29            9.40
## 100        ohc      four        120       2bbl 3.33   3.47            8.50
## 101        ohc      four        120       2bbl 3.33   3.47            8.50
## 102       ohcv       six        181       mpfi 3.43   3.27            9.00
## 103       ohcv       six        181       mpfi 3.43   3.27            9.00
## 104       ohcv       six        181       mpfi 3.43   3.27            9.00
## 105       ohcv       six        181       mpfi 3.43   3.27            9.00
## 106       ohcv       six        181       mpfi 3.43   3.27            7.80
## 107       ohcv       six        181       mpfi 3.43   3.27            9.00
## 108          l      four        120       mpfi 3.46   3.19            8.40
## 109          l      four        152        idi 3.70   3.52           21.00
## 110          l      four        120       mpfi 3.46   3.19            8.40
## 111          l      four        152        idi 3.70   3.52           21.00
## 112          l      four        120       mpfi 3.46   2.19            8.40
## 113          l      four        152        idi 3.70   3.52           21.00
## 114          l      four        120       mpfi 3.46   2.19            8.40
## 115          l      four        152        idi 3.70   3.52           21.00
## 116          l      four        120       mpfi 3.46   3.19            8.40
## 117          l      four        152        idi 3.70   3.52           21.00
## 118          l      four        134       mpfi 3.61   3.21            7.00
## 119        ohc      four         90       2bbl 2.97   3.23            9.40
## 120        ohc      four         98       spdi 3.03   3.39            7.60
## 121        ohc      four         90       2bbl 2.97   3.23            9.40
## 122        ohc      four         90       2bbl 2.97   3.23            9.40
## 123        ohc      four         98       2bbl 2.97   3.23            9.40
## 124        ohc      four        122       2bbl 3.35   3.46            8.50
## 125        ohc      four        156       spdi 3.59   3.86            7.00
## 126        ohc      four        151       mpfi 3.94   3.11            9.50
## 127       ohcf       six        194       mpfi 3.74   2.90            9.50
## 128       ohcf       six        194       mpfi 3.74   2.90            9.50
## 129       ohcf       six        194       mpfi 3.74   2.90            9.50
## 130      dohcv     eight        203       mpfi 3.94   3.11           10.00
## 131        ohc      four        132       mpfi 3.46   3.90            8.70
## 132        ohc      four        132       mpfi 3.46   3.90            8.70
## 133        ohc      four        121       mpfi 3.54   3.07            9.31
## 134        ohc      four        121       mpfi 3.54   3.07            9.30
## 135        ohc      four        121       mpfi 2.54   2.07            9.30
## 136        ohc      four        121       mpfi 3.54   3.07            9.30
## 137       dohc      four        121       mpfi 3.54   3.07            9.00
## 138       dohc      four        121       mpfi 3.54   3.07            9.00
## 139       ohcf      four         97       2bbl 3.62   2.36            9.00
## 140       ohcf      four        108       2bbl 3.62   2.64            8.70
## 141       ohcf      four        108       2bbl 3.62   2.64            8.70
## 142       ohcf      four        108       2bbl 3.62   2.64            9.50
## 143       ohcf      four        108       2bbl 3.62   2.64            9.50
## 144       ohcf      four        108       mpfi 3.62   2.64            9.00
## 145       ohcf      four        108       2bbl 3.62   2.64            9.00
## 146       ohcf      four        108       mpfi 3.62   2.64            7.70
## 147       ohcf      four        108       2bbl 3.62   2.64            9.00
```

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## 148       ohcf      four        108       mpfi 3.62   2.64            9.00
## 149       ohcf      four        108       2bbl 3.62   2.64            9.00
## 150       ohcf      four        108       mpfi 3.62   2.64            7.70
## 151        ohc      four         92       2bbl 3.05   3.03            9.00
## 152        ohc      four         92       2bbl 3.05   3.03            9.00
## 153        ohc      four         92       2bbl 3.05   3.03            9.00
## 154        ohc      four         92       2bbl 3.05   3.03            9.00
## 155        ohc      four         92       2bbl 3.05   3.03            9.00
## 156        ohc      four         92       2bbl 3.05   3.03            9.00
## 157        ohc      four         98       2bbl 3.19   3.03            9.00
## 158        ohc      four         98       2bbl 3.19   3.03            9.00
## 159        ohc      four        110        idi 3.27   3.35           22.50
## 160        ohc      four        110        idi 3.27   3.35           22.50
## 161        ohc      four         98       2bbl 3.19   3.03            9.00
## 162        ohc      four         98       2bbl 3.19   3.03            9.00
## 163        ohc      four         98       2bbl 3.19   3.03            9.00
## 164        ohc      four         98       2bbl 3.19   3.03            9.00
## 165        ohc      four         98       2bbl 3.19   3.03            9.00
## 166       dohc      four         98       mpfi 3.24   3.08            9.40
## 167       dohc      four         98       mpfi 3.24   3.08            9.40
## 168        ohc      four        146       mpfi 3.62   3.50            9.30
## 169        ohc      four        146       mpfi 3.62   3.50            9.30
## 170        ohc      four        146       mpfi 3.62   3.50            9.30
## 171        ohc      four        146       mpfi 3.62   3.50            9.30
## 172        ohc      four        146       mpfi 3.62   3.50            9.30
## 173        ohc      four        146       mpfi 3.62   3.50            9.30
## 174        ohc      four        122       mpfi 3.31   3.54            8.70
## 175        ohc      four        110        idi 3.27   3.35           22.50
## 176        ohc      four        122       mpfi 3.31   3.54            8.70
## 177        ohc      four        122       mpfi 3.31   3.54            8.70
## 178        ohc      four        122       mpfi 3.31   3.54            8.70
## 179       dohc       six        171       mpfi 3.27   3.35            9.30
## 180       dohc       six        171       mpfi 3.27   3.35            9.30
## 181       dohc       six        171       mpfi 3.27   3.35            9.20
## 182       dohc       six        161       mpfi 3.27   3.35            9.20
## 183        ohc      four         97        idi 3.01   3.40           23.00
## 184        ohc      four        109       mpfi 3.19   3.40            9.00
## 185        ohc      four         97        idi 3.01   3.40           23.00
## 186        ohc      four        109       mpfi 3.19   3.40            9.00
## 187        ohc      four        109       mpfi 3.19   3.40            9.00
## 188        ohc      four         97        idi 3.01   3.40           23.00
## 189        ohc      four        109       mpfi 3.19   3.40           10.00
## 190        ohc      four        109       mpfi 3.19   3.40            8.50
## 191        ohc      four        109       mpfi 3.19   3.40            8.50
## 192        ohc      five        136       mpfi 3.19   3.40            8.50
## 193        ohc      four         97        idi 3.01   3.40           23.00
## 194        ohc      four        109       mpfi 3.19   3.40            9.00
## 195        ohc      four        141       mpfi 3.78   3.15            9.50
## 196        ohc      four        141       mpfi 3.78   3.15            9.50
## 197        ohc      four        141       mpfi 3.78   3.15            9.50
## 198        ohc      four        141       mpfi 3.78   3.15            9.50
## 199        ohc      four        130       mpfi 3.62   3.15            7.50
## 200        ohc      four        130       mpfi 3.62   3.15            7.50
## 201        ohc      four        141       mpfi 3.78   3.15            9.50
```

```
## 202        ohc      four        141       mpfi 3.78   3.15             8.70
## 203       ohcv       six        173       mpfi 3.58   2.87             8.80
## 204        ohc       six        145        idi 3.01   3.40            23.00
## 205        ohc      four        141       mpfi 3.78   3.15             9.50
##     horsePower peakRpm cityMpg highwayMpg price
## 1          111    5000      21         27 13495
## 2          111    5000      21         27 16500
## 3          154    5000      19         26 16500
## 4          102    5500      24         30 13950
## 5          115    5500      18         22 17450
## 6          110    5500      19         25 15250
## 7          110    5500      19         25 17710
## 8          110    5500      19         25 18920
## 9          140    5500      17         20 23875
## 10         160    5500      16         22    NA
## 11         101    5800      23         29 16430
## 12         101    5800      23         29 16925
## 13         121    4250      21         28 20970
## 14         121    4250      21         28 21105
## 15         121    4250      20         25 24565
## 16         182    5400      16         22 30760
## 17         182    5400      16         22 41315
## 18         182    5400      15         20 36880
## 19          48    5100      47         53  5151
## 20          70    5400      38         43  6295
## 21          70    5400      38         43  6575
## 22          68    5500      37         41  5572
## 23          68    5500      31         38  6377
## 24         102    5500      24         30  7957
## 25          68    5500      31         38  6229
## 26          68    5500      31         38  6692
## 27          68    5500      31         38  7609
## 28         102    5500      24         30  8558
## 29          88    5000      24         30  8921
## 30         145    5000      19         24 12964
## 31          58    4800      49         54  6479
## 32          76    6000      31         38  6855
## 33          60    5500      38         42  5399
## 34          76    6000      30         34  6529
## 35          76    6000      30         34  7129
## 36          76    6000      30         34  7295
## 37          76    6000      30         34  7295
## 38          86    5800      27         33  7895
## 39          86    5800      27         33  9095
## 40          86    5800      27         33  8845
## 41          86    5800      27         33 10295
## 42         101    5800      24         28 12945
## 43         100    5500      25         31 10345
## 44          78    4800      24         29  6785
## 45          70    5400      38         43    NA
## 46          70    5400      38         43    NA
## 47          90    5000      24         29 11048
## 48         176    4750      15         19 32250
## 49         176    4750      15         19 35550
```

```
## 50          262    5000       13          17 36000
## 51           68    5000       30          31  5195
## 52           68    5000       31          38  6095
## 53           68    5000       31          38  6795
## 54           68    5000       31          38  6695
## 55           68    5000       31          38  7395
## 56          101    6000       17          23 10945
## 57          101    6000       17          23 11845
## 58          101    6000       17          23 13645
## 59          135    6000       16          23 15645
## 60           84    4800       26          32  8845
## 61           84    4800       26          32  8495
## 62           84    4800       26          32 10595
## 63           84    4800       26          32 10245
## 64           64    4650       36          42 10795
## 65           84    4800       26          32 11245
## 66          120    5000       19          27 18280
## 67           72    4200       31          39 18344
## 68          123    4350       22          25 25552
## 69          123    4350       22          25 28248
## 70          123    4350       22          25 28176
## 71          123    4350       22          25 31600
## 72          155    4750       16          18 34184
## 73          155    4750       16          18 35056
## 74          184    4500       14          16 40960
## 75          184    4500       14          16 45400
## 76          175    5000       19          24 16503
## 77           68    5500       37          41  5389
## 78           68    5500       31          38  6189
## 79           68    5500       31          38  6669
## 80          102    5500       24          30  7689
## 81          116    5500       23          30  9959
## 82           88    5000       25          32  8499
## 83          145    5000       19          24 12629
## 84          145    5000       19          24 14869
## 85          145    5000       19          24 14489
## 86           88    5000       25          32  6989
## 87           88    5000       25          32  8189
## 88          116    5500       23          30  9279
## 89          116    5500       23          30  9279
## 90           69    5200       31          37  5499
## 91           55    4800       45          50  7099
## 92           69    5200       31          37  6649
## 93           69    5200       31          37  6849
## 94           69    5200       31          37  7349
## 95           69    5200       31          37  7299
## 96           69    5200       31          37  7799
## 97           69    5200       31          37  7499
## 98           69    5200       31          37  7999
## 99           69    5200       31          37  8249
## 100          97    5200       27          34  8949
## 101          97    5200       27          34  9549
## 102         152    5200       17          22 13499
## 103         152    5200       17          22 14399
```

```
## 104        152    5200       19          25 13499
## 105        160    5200       19          25 17199
## 106        200    5200       17          23 19699
## 107        160    5200       19          25 18399
## 108         97    5000       19          24 11900
## 109         95    4150       28          33 13200
## 110         97    5000       19          24 12440
## 111         95    4150       25          25 13860
## 112         95    5000       19          24 15580
## 113         95    4150       28          33 16900
## 114         95    5000       19          24 16695
## 115         95    4150       25          25 17075
## 116         97    5000       19          24 16630
## 117         95    4150       28          33 17950
## 118        142    5600       18          24 18150
## 119         68    5500       37          41  5572
## 120        102    5500       24          30  7957
## 121         68    5500       31          38  6229
## 122         68    5500       31          38  6692
## 123         68    5500       31          38  7609
## 124         88    5000       24          30  8921
## 125        145    5000       19          24 12764
## 126        143    5500       19          27 22018
## 127        207    5900       17          25 32528
## 128        207    5900       17          25 34028
## 129        207    5900       17          25 37028
## 130        288    5750       17          28    NA
## 131         NA      NA       23          31  9295
## 132         NA      NA       23          31  9895
## 133        110    5250       21          28 11850
## 134        110    5250       21          28 12170
## 135        110    5250       21          28 15040
## 136        110    5250       21          28 15510
## 137        160    5500       19          26 18150
## 138        160    5500       19          26 18620
## 139         69    4900       31          36  5118
## 140         73    4400       26          31  7053
## 141         73    4400       26          31  7603
## 142         82    4800       32          37  7126
## 143         82    4400       28          33  7775
## 144         94    5200       26          32  9960
## 145         82    4800       24          25  9233
## 146        111    4800       24          29 11259
## 147         82    4800       28          32  7463
## 148         94    5200       25          31 10198
## 149         82    4800       23          29  8013
## 150        111    4800       23          23 11694
## 151         62    4800       35          39  5348
## 152         62    4800       31          38  6338
## 153         62    4800       31          38  6488
## 154         62    4800       31          37  6918
## 155         62    4800       27          32  7898
## 156         62    4800       27          32  8778
## 157         70    4800       30          37  6938
```

```
## 158         70    4800      30         37  7198
## 159         56    4500      34         36  7898
## 160         56    4500      38         47  7788
## 161         70    4800      38         47  7738
## 162         70    4800      28         34  8358
## 163         70    4800      28         34  9258
## 164         70    4800      29         34  8058
## 165         70    4800      29         34  8238
## 166        112    6600      26         29  9298
## 167        112    6600      26         29  9538
## 168        116    4800      24         30  8449
## 169        116    4800      24         30  9639
## 170        116    4800      24         30  9989
## 171        116    4800      24         30 11199
## 172        116    4800      24         30 11549
## 173        116    4800      24         30 17669
## 174         92    4200      29         34  8948
## 175         73    4500      30         33 10698
## 176         92    4200      27         32  9988
## 177         92    4200      27         32 10898
## 178         92    4200      27         32 11248
## 179        161    5200      20         24 16558
## 180        161    5200      19         24 15998
## 181        156    5200      20         24 15690
## 182        156    5200      19         24 15750
## 183         52    4800      37         46  7775
## 184         85    5250      27         34  7975
## 185         52    4800      37         46  7995
## 186         85    5250      27         34  8195
## 187         85    5250      27         34  8495
## 188         68    4500      37         42  9495
## 189        100    5500      26         32  9995
## 190         90    5500      24         29 11595
## 191         90    5500      24         29  9980
## 192        110    5500      19         24 13295
## 193         68    4500      33         38 13845
## 194         88    5500      25         31 12290
## 195        114    5400      23         28 12940
## 196        114    5400      23         28 13415
## 197        114    5400      24         28 15985
## 198        114    5400      24         28 16515
## 199        162    5100      17         22 18420
## 200        162    5100      17         22 18950
## 201        114    5400      23         28 16845
## 202        160    5300      19         25 19045
## 203        134    5500      18         23 21485
## 204        106    4800      26         27 22470
## 205        114    5400      19         25 22625
```

h) Combinar las tres últimas imputaciones para obtener un conjunto de datos definitivo.

```
# Convertir el objeto en un dataframe
df <- as.data.frame(carIns)
```

```r
# Imputar la media en las columnas de tipo double
dataH <- df %>%
  mutate_if(is.double, ~ ifelse(is.na(.), mean(., na.rm = TRUE), .))

# Función para calcular la moda
calculate_mode <- function(x) {
  mod <- as.data.frame(table(x))
  mod <- mod[which.max(mod$Freq), 1]
  return(mod)
}

# Calcula la Moda de las columnas numericas de un dataframe y reemplaza los valores NA por la moda corr
dfH <- df %>%
  mutate(across(where(is.numeric), ~ ifelse(is.na(.), calculate_mode(.), .)))

# Calcula la moda de la columna "nDoors"
modaNdoors <- calculate_mode(dfH$nDoors)

# Reemplaza los valores NA de la columna nDoors con la moda calculada
dfH <- dfH %>%
  mutate(nDoors = replace_na(nDoors, modaNdoors))

# Imprimir el nuevo dataframe imputado
print(dfH)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      3       42   alfa-romero      gas        std    two convertible
## 2      3       42   alfa-romero      gas        std    two convertible
## 3      1       42   alfa-romero      gas        std    two   hatchback
## 4      2      164          audi      gas        std   four       sedan
## 5      2      164          audi      gas        std   four       sedan
## 6      2       42          audi      gas        std    two       sedan
## 7      1      158          audi      gas        std   four       sedan
## 8      1       42          audi      gas        std   four       wagon
## 9      1      158          audi      gas      turbo   four       sedan
## 10     0       42          audi      gas      turbo    two   hatchback
## 11     2      192           bmw      gas        std    two       sedan
## 12     0      192           bmw      gas        std   four       sedan
## 13     0      188           bmw      gas        std    two       sedan
## 14     0      188           bmw      gas        std   four       sedan
## 15     1       42           bmw      gas        std   four       sedan
## 16     0       42           bmw      gas        std   four       sedan
## 17     0       42           bmw      gas        std    two       sedan
## 18     0       42           bmw      gas        std   four       sedan
## 19     2      121     chevrolet      gas        std    two   hatchback
## 20     1       98     chevrolet      gas        std    two   hatchback
## 21     0       81     chevrolet      gas        std   four       sedan
## 22     1      118         dodge      gas        std    two   hatchback
## 23     1      118         dodge      gas        std    two   hatchback
## 24     1      118         dodge      gas      turbo    two   hatchback
## 25     1      148         dodge      gas        std   four   hatchback
## 26     1      148         dodge      gas        std   four       sedan
## 27     1      148         dodge      gas        std   four       sedan
## 28     1      148         dodge      gas      turbo   four       sedan
```

```
## 29    -1      110         dodge      gas        std   four       wagon
## 30     3      145         dodge      gas      turbo    two  hatchback
## 31     2      137         honda      gas        std    two  hatchback
## 32     2      137         honda      gas        std    two  hatchback
## 33     1      101         honda      gas        std    two  hatchback
## 34     1      101         honda      gas        std    two  hatchback
## 35     1      101         honda      gas        std    two  hatchback
## 36     0      110         honda      gas        std   four       sedan
## 37     0       78         honda      gas        std   four       wagon
## 38     0      106         honda      gas        std    two  hatchback
## 39     0      106         honda      gas        std    two  hatchback
## 40     0       85         honda      gas        std   four       sedan
## 41     0       85         honda      gas        std   four       sedan
## 42     0       85         honda      gas        std   four       sedan
## 43     1      107         honda      gas        std    two       sedan
## 44     0       42         isuzu      gas        std   four       sedan
## 45     1       42         isuzu      gas        std    two       sedan
## 46     0       42         isuzu      gas        std   four       sedan
## 47     2       42         isuzu      gas        std    two  hatchback
## 48     0      145        jaguar      gas        std   four       sedan
## 49     0       42        jaguar      gas        std   four       sedan
## 50     0       42        jaguar      gas        std    two       sedan
## 51     1      104         mazda      gas        std    two  hatchback
## 52     1      104         mazda      gas        std    two  hatchback
## 53     1      104         mazda      gas        std    two  hatchback
## 54     1      113         mazda      gas        std   four       sedan
## 55     1      113         mazda      gas        std   four       sedan
## 56     3      150         mazda      gas        std    two  hatchback
## 57     3      150         mazda      gas        std    two  hatchback
## 58     3      150         mazda      gas        std    two  hatchback
## 59     3      150         mazda      gas        std    two  hatchback
## 60     1      129         mazda      gas        std    two  hatchback
## 61     0      115         mazda      gas        std   four       sedan
## 62     1      129         mazda      gas        std    two  hatchback
## 63     0      115         mazda      gas        std   four       sedan
## 64     0       42         mazda   diesel        std   four       sedan
## 65     0      115         mazda      gas        std   four  hatchback
## 66     0      118         mazda      gas        std   four       sedan
## 67     0       42         mazda   diesel        std   four       sedan
## 68    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 69    -1       93 mercedes-benz   diesel      turbo   four       wagon
## 70     0       93 mercedes-benz   diesel      turbo    two     hardtop
## 71    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 72    -1       42 mercedes-benz      gas        std   four       sedan
## 73     3      142 mercedes-benz      gas        std    two convertible
## 74     0       42 mercedes-benz      gas        std   four       sedan
## 75     1       42 mercedes-benz      gas        std    two     hardtop
## 76     1       42       mercury      gas      turbo    two  hatchback
## 77     2      161    mitsubishi      gas        std    two  hatchback
## 78     2      161    mitsubishi      gas        std    two  hatchback
## 79     2      161    mitsubishi      gas        std    two  hatchback
## 80     1      161    mitsubishi      gas      turbo    two  hatchback
## 81     3      153    mitsubishi      gas      turbo    two  hatchback
## 82     3      153    mitsubishi      gas        std    two  hatchback
```

```
## 83     3       42    mitsubishi      gas      turbo    two   hatchback
## 84     3       42    mitsubishi      gas      turbo    two   hatchback
## 85     3       42    mitsubishi      gas      turbo    two   hatchback
## 86     1      125    mitsubishi      gas        std   four       sedan
## 87     1      125    mitsubishi      gas        std   four       sedan
## 88     1      125    mitsubishi      gas      turbo   four       sedan
## 89    -1      137    mitsubishi      gas        std   four       sedan
## 90     1      128        nissan      gas        std    two       sedan
## 91     1      128        nissan   diesel        std    two       sedan
## 92     1      128        nissan      gas        std    two       sedan
## 93     1      122        nissan      gas        std   four       sedan
## 94     1      103        nissan      gas        std   four       wagon
## 95     1      128        nissan      gas        std    two       sedan
## 96     1      128        nissan      gas        std    two   hatchback
## 97     1      122        nissan      gas        std   four       sedan
## 98     1      103        nissan      gas        std   four       wagon
## 99     2      168        nissan      gas        std    two     hardtop
## 100    0      106        nissan      gas        std   four   hatchback
## 101    0      106        nissan      gas        std   four       sedan
## 102    0      128        nissan      gas        std   four       sedan
## 103    0      108        nissan      gas        std   four       wagon
## 104    0      108        nissan      gas        std   four       sedan
## 105    3      194        nissan      gas        std    two   hatchback
## 106    3      194        nissan      gas      turbo    two   hatchback
## 107    1      231        nissan      gas        std    two   hatchback
## 108    0      161        peugot      gas        std   four       sedan
## 109    0      161        peugot   diesel      turbo   four       sedan
## 110    0       42        peugot      gas        std   four       wagon
## 111    0       42        peugot   diesel      turbo   four       wagon
## 112    0      161        peugot      gas        std   four       sedan
## 113    0      161        peugot   diesel      turbo   four       sedan
## 114    0       42        peugot      gas        std   four       wagon
## 115    0       42        peugot   diesel      turbo   four       wagon
## 116    0      161        peugot      gas        std   four       sedan
## 117    0      161        peugot   diesel      turbo   four       sedan
## 118    0      161        peugot      gas      turbo   four       sedan
## 119    1      119      plymouth      gas        std    two   hatchback
## 120    1      119      plymouth      gas      turbo    two   hatchback
## 121    1      154      plymouth      gas        std   four   hatchback
## 122    1      154      plymouth      gas        std   four       sedan
## 123    1      154      plymouth      gas        std   four       sedan
## 124   -1       74      plymouth      gas        std   four       wagon
## 125    3       42      plymouth      gas      turbo    two   hatchback
## 126    3      186       porsche      gas        std    two   hatchback
## 127    3       42       porsche      gas        std    two     hardtop
## 128    3       42       porsche      gas        std    two     hardtop
## 129    3       42       porsche      gas        std    two convertible
## 130    1       42       porsche      gas        std    two   hatchback
## 131    0       42       renault      gas        std   four       wagon
## 132    2       42       renault      gas        std    two   hatchback
## 133    3      150          saab      gas        std    two   hatchback
## 134    2      104          saab      gas        std   four       sedan
## 135    3      150          saab      gas        std    two   hatchback
## 136    2      104          saab      gas        std   four       sedan
```

```
## 137    3      150          saab      gas      turbo    two   hatchback
## 138    2      104          saab      gas      turbo   four       sedan
## 139    2       83        subaru      gas        std    two   hatchback
## 140    2       83        subaru      gas        std    two   hatchback
## 141    2       83        subaru      gas        std    two   hatchback
## 142    0      102        subaru      gas        std   four       sedan
## 143    0      102        subaru      gas        std   four       sedan
## 144    0      102        subaru      gas        std   four       sedan
## 145    0      102        subaru      gas        std   four       sedan
## 146    0      102        subaru      gas      turbo   four       sedan
## 147    0       89        subaru      gas        std   four       wagon
## 148    0       89        subaru      gas        std   four       wagon
## 149    0       85        subaru      gas        std   four       wagon
## 150    0       85        subaru      gas      turbo   four       wagon
## 151    1       87        toyota      gas        std    two   hatchback
## 152    1       87        toyota      gas        std    two   hatchback
## 153    1       74        toyota      gas        std   four   hatchback
## 154    0       77        toyota      gas        std   four       wagon
## 155    0       81        toyota      gas        std   four       wagon
## 156    0       91        toyota      gas        std   four       wagon
## 157    0       91        toyota      gas        std   four       sedan
## 158    0       91        toyota      gas        std   four   hatchback
## 159    0       91        toyota   diesel        std   four       sedan
## 160    0       91        toyota   diesel        std   four   hatchback
## 161    0       91        toyota      gas        std   four       sedan
## 162    0       91        toyota      gas        std   four   hatchback
## 163    0       91        toyota      gas        std   four       sedan
## 164    1      168        toyota      gas        std    two       sedan
## 165    1      168        toyota      gas        std    two   hatchback
## 166    1      168        toyota      gas        std    two       sedan
## 167    1      168        toyota      gas        std    two   hatchback
## 168    2      134        toyota      gas        std    two     hardtop
## 169    2      134        toyota      gas        std    two     hardtop
## 170    2      134        toyota      gas        std    two   hatchback
## 171    2      134        toyota      gas        std    two     hardtop
## 172    2      134        toyota      gas        std    two   hatchback
## 173    2      134        toyota      gas        std    two convertible
## 174   -1       65        toyota      gas        std   four       sedan
## 175   -1       65        toyota   diesel      turbo   four       sedan
## 176   -1       65        toyota      gas        std   four   hatchback
## 177   -1       65        toyota      gas        std   four       sedan
## 178   -1       65        toyota      gas        std   four   hatchback
## 179    3      197        toyota      gas        std    two   hatchback
## 180    3      197        toyota      gas        std    two   hatchback
## 181   -1       90        toyota      gas        std   four       sedan
## 182   -1       42        toyota      gas        std   four       wagon
## 183    2      122    volkswagen   diesel        std    two       sedan
## 184    2      122    volkswagen      gas        std    two       sedan
## 185    2       94    volkswagen   diesel        std   four       sedan
## 186    2       94    volkswagen      gas        std   four       sedan
## 187    2       94    volkswagen      gas        std   four       sedan
## 188    2       94    volkswagen   diesel      turbo   four       sedan
## 189    2       94    volkswagen      gas        std   four       sedan
## 190    3       42    volkswagen      gas        std    two convertible
```

```
## 191    3      256    volkswagen      gas        std    two   hatchback
## 192    0       42    volkswagen      gas        std   four       sedan
## 193    0       42    volkswagen   diesel      turbo   four       sedan
## 194    0       42    volkswagen      gas        std   four       wagon
## 195   -2      103         volvo      gas        std   four       sedan
## 196   -1       74         volvo      gas        std   four       wagon
## 197   -2      103         volvo      gas        std   four       sedan
## 198   -1       74         volvo      gas        std   four       wagon
## 199   -2      103         volvo      gas      turbo   four       sedan
## 200   -1       74         volvo      gas      turbo   four       wagon
## 201   -1       95         volvo      gas        std   four       sedan
## 202   -1       95         volvo      gas      turbo   four       sedan
## 203   -1       95         volvo      gas        std   four       sedan
## 204   -1       95         volvo   diesel      turbo   four       sedan
## 205   -1       95         volvo      gas      turbo   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           rwd          front      88.6  168.8  64.1   48.8       2548
## 2           rwd          front      88.6  168.8  64.1   48.8       2548
## 3           rwd          front      94.5  171.2  65.5   52.4       2823
## 4           fwd          front      99.8  176.6  66.2   54.3       2337
## 5           4wd          front      99.4  176.6  66.4   54.3       2824
## 6           fwd          front      99.8  177.3  66.3   53.1       2507
## 7           fwd          front     105.8  192.7  71.4   55.7       2844
## 8           fwd          front     105.8  192.7  71.4   55.7       2954
## 9           fwd          front     105.8  192.7  71.4   55.9       3086
## 10          4wd          front      99.5  178.2  67.9   52.0       3053
## 11          rwd          front     101.2  176.8  64.8   54.3       2395
## 12          rwd          front     101.2  176.8  64.8   54.3       2395
## 13          rwd          front     101.2  176.8  64.8   54.3       2710
## 14          rwd          front     101.2  176.8  64.8   54.3       2765
## 15          rwd          front     103.5  189.0  66.9   55.7       3055
## 16          rwd          front     103.5  189.0  66.9   55.7       3230
## 17          rwd          front     103.5  193.8  67.9   53.7       3380
## 18          rwd          front     110.0  197.0  70.9   56.3       3505
## 19          fwd          front      88.4  141.1  60.3   53.2       1488
## 20          fwd          front      94.5  155.9  63.6   52.0       1874
## 21          fwd          front      94.5  158.8  63.6   52.0       1909
## 22          fwd          front      93.7  157.3  63.8   50.8       1876
## 23          fwd          front      93.7  157.3  63.8   50.8       1876
## 24          fwd          front      93.7  157.3  63.8   50.8       2128
## 25          fwd          front      93.7  157.3  63.8   50.6       1967
## 26          fwd          front      93.7  157.3  63.8   50.6       1989
## 27          fwd          front      93.7  157.3  63.8   50.6       1989
## 28          fwd          front      93.7  157.3  63.8   50.6       2191
## 29          fwd          front     103.3  174.6  64.6   59.8       2535
## 30          fwd          front      95.9  173.2  66.3   50.2       2811
## 31          fwd          front      86.6  144.6  63.9   50.8       1713
## 32          fwd          front      86.6  144.6  63.9   50.8       1819
## 33          fwd          front      93.7  150.0  64.0   52.6       1837
## 34          fwd          front      93.7  150.0  64.0   52.6       1940
## 35          fwd          front      93.7  150.0  64.0   52.6       1956
## 36          fwd          front      96.5  163.4  64.0   54.5       2010
## 37          fwd          front      96.5  157.1  63.9   58.3       2024
## 38          fwd          front      96.5  167.5  65.2   53.3       2236
```

```
## 39          fwd          front       96.5  167.5  65.2   53.3        2289
## 40          fwd          front       96.5  175.4  65.2   54.1        2304
## 41          fwd          front       96.5  175.4  62.5   54.1        2372
## 42          fwd          front       96.5  175.4  65.2   54.1        2465
## 43          fwd          front       96.5  169.1  66.0   51.0        2293
## 44          rwd          front       94.3  170.7  61.8   53.5        2337
## 45          fwd          front       94.5  155.9  63.6   52.0        1874
## 46          fwd          front       94.5  155.9  63.6   52.0        1909
## 47          rwd          front       96.0  172.6  65.2   51.4        2734
## 48          rwd          front      113.0  199.6  69.6   52.8        4066
## 49          rwd          front      113.0  199.6  69.6   52.8        4066
## 50          rwd          front      102.0  191.7  70.6   47.8        3950
## 51          fwd          front       93.1  159.1  64.2   54.1        1890
## 52          fwd          front       93.1  159.1  64.2   54.1        1900
## 53          fwd          front       93.1  159.1  64.2   54.1        1905
## 54          fwd          front       93.1  166.8  64.2   54.1        1945
## 55          fwd          front       93.1  166.8  64.2   54.1        1950
## 56          rwd          front       95.3  169.0  65.7   49.6        2380
## 57          rwd          front       95.3  169.0  65.7   49.6        2380
## 58          rwd          front       95.3  169.0  65.7   49.6        2385
## 59          rwd          front       95.3  169.0  65.7   49.6        2500
## 60          fwd          front       98.8  177.8  66.5   53.7        2385
## 61          fwd          front       98.8  177.8  66.5   55.5        2410
## 62          fwd          front       98.8  177.8  66.5   53.7        2385
## 63          fwd          front       98.8  177.8  66.5   55.5        2410
## 64          fwd          front       98.8  177.8  66.5   55.5        2443
## 65          fwd          front       98.8  177.8  66.5   55.5        2425
## 66          rwd          front      104.9  175.0  66.1   54.4        2670
## 67          rwd          front      104.9  175.0  66.1   54.4        2700
## 68          rwd          front      110.0  190.9  70.3   56.5        3515
## 69          rwd          front      110.0  190.9  70.3   58.7        3750
## 70          rwd          front      106.7  187.5  70.3   54.9        3495
## 71          rwd          front      115.6  202.6  71.7   56.3        3770
## 72          rwd          front      115.6  202.6  71.7   56.5        3740
## 73          rwd          front       96.6  180.3  70.5   50.8        3685
## 74          rwd          front      120.9  208.1  71.7   56.7        3900
## 75          rwd          front      112.0  199.2  72.0   55.4        3715
## 76          rwd          front      102.7  178.4  68.0   54.8        2910
## 77          fwd          front       93.7  157.3  64.4   50.8        1918
## 78          fwd          front       93.7  157.3  64.4   50.8        1944
## 79          fwd          front       93.7  157.3  64.4   50.8        2004
## 80          fwd          front       93.0  157.3  63.8   50.8        2145
## 81          fwd          front       96.3  173.0  65.4   49.4        2370
## 82          fwd          front       96.3  173.0  65.4   49.4        2328
## 83          fwd          front       95.9  173.2  66.3   50.2        2833
## 84          fwd          front       95.9  173.2  66.3   50.2        2921
## 85          fwd          front       95.9  173.2  66.3   50.2        2926
## 86          fwd          front       96.3  172.4  65.4   51.6        2365
## 87          fwd          front       96.3  172.4  65.4   51.6        2405
## 88          fwd          front       96.3  172.4  65.4   51.6        2403
## 89          fwd          front       96.3  172.4  65.4   51.6        2403
## 90          fwd          front       94.5  165.3  63.8   54.5        1889
## 91          fwd          front       94.5  165.3  63.8   54.5        2017
## 92          fwd          front       94.5  165.3  63.8   54.5        1918
```

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## 93          fwd          front       94.5  165.3  63.8   54.5        1938
## 94          fwd          front       94.5  170.2  63.8   53.5        2024
## 95          fwd          front       94.5  165.3  63.8   54.5        1951
## 96          fwd          front       94.5  165.6  63.8   53.3        2028
## 97          fwd          front       94.5  165.3  63.8   54.5        1971
## 98          fwd          front       94.5  170.2  63.8   53.5        2037
## 99          fwd          front       95.1  162.4  63.8   53.3        2008
## 100         fwd          front       97.2  173.4  65.2   54.7        2324
## 101         fwd          front       97.2  173.4  65.2   54.7        2302
## 102         fwd          front      100.4  181.7  66.5   55.1        3095
## 103         fwd          front      100.4  184.6  66.5   56.1        3296
## 104         fwd          front      100.4  184.6  66.5   55.1        3060
## 105         rwd          front       91.3  170.7  67.9   49.7        3071
## 106         rwd          front       91.3  170.7  67.9   49.7        3139
## 107         rwd          front       99.2  178.5  67.9   49.7        3139
## 108         rwd          front      107.9  186.7  68.4   56.7        3020
## 109         rwd          front      107.9  186.7  68.4   56.7        3197
## 110         rwd          front      114.2  198.9  68.4   58.7        3230
## 111         rwd          front      114.2  198.9  68.4   58.7        3430
## 112         rwd          front      107.9  186.7  68.4   56.7        3075
## 113         rwd          front      107.9  186.7  68.4   56.7        3252
## 114         rwd          front      114.2  198.9  68.4   56.7        3285
## 115         rwd          front      114.2  198.9  68.4   58.7        3485
## 116         rwd          front      107.9  186.7  68.4   56.7        3075
## 117         rwd          front      107.9  186.7  68.4   56.7        3252
## 118         rwd          front      108.0  186.7  68.3   56.0        3130
## 119         fwd          front       93.7  157.3  63.8   50.8        1918
## 120         fwd          front       93.7  157.3  63.8   50.8        2128
## 121         fwd          front       93.7  157.3  63.8   50.6        1967
## 122         fwd          front       93.7  167.3  63.8   50.8        1989
## 123         fwd          front       93.7  167.3  63.8   50.8        2191
## 124         fwd          front      103.3  174.6  64.6   59.8        2535
## 125         rwd          front       95.9  173.2  66.3   50.2        2818
## 126         rwd          front       94.5  168.9  68.3   50.2        2778
## 127         rwd           rear       89.5  168.9  65.0   51.6        2756
## 128         rwd           rear       89.5  168.9  65.0   51.6        2756
## 129         rwd           rear       89.5  168.9  65.0   51.6        2800
## 130         rwd          front       98.4  175.7  72.3   50.5        3366
## 131         fwd          front       96.1  181.5  66.5   55.2        2579
## 132         fwd          front       96.1  176.8  66.6   50.5        2460
## 133         fwd          front       99.1  186.6  66.5   56.1        2658
## 134         fwd          front       99.1  186.6  66.5   56.1        2695
## 135         fwd          front       99.1  186.6  66.5   56.1        2707
## 136         fwd          front       99.1  186.6  66.5   56.1        2758
## 137         fwd          front       99.1  186.6  66.5   56.1        2808
## 138         fwd          front       99.1  186.6  66.5   56.1        2847
## 139         fwd          front       93.7  156.9  63.4   53.7        2050
## 140         fwd          front       93.7  157.9  63.6   53.7        2120
## 141         4wd          front       93.3  157.3  63.8   55.7        2240
## 142         fwd          front       97.2  172.0  65.4   52.5        2145
## 143         fwd          front       97.2  172.0  65.4   52.5        2190
## 144         fwd          front       97.2  172.0  65.4   52.5        2340
## 145         4wd          front       97.0  172.0  65.4   54.3        2385
## 146         4wd          front       97.0  172.0  65.4   54.3        2510
```

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## 147         fwd         front       97.0  173.5  65.4   53.0        2290
## 148         fwd         front       97.0  173.5  65.4   53.0        2455
## 149         4wd         front       96.9  173.6  65.4   54.9        2420
## 150         4wd         front       96.9  173.6  65.4   54.9        2650
## 151         fwd         front       95.7  158.7  63.6   54.5        1985
## 152         fwd         front       95.7  158.7  63.6   54.5        2040
## 153         fwd         front       95.7  158.7  63.6   54.5        2015
## 154         fwd         front       95.7  169.7  63.6   59.1        2280
## 155         4wd         front       95.7  169.7  63.6   59.1        2290
## 156         4wd         front       95.7  169.7  63.6   59.1        3110
## 157         fwd         front       95.7  166.3  64.4   53.0        2081
## 158         fwd         front       95.7  166.3  64.4   52.8        2109
## 159         fwd         front       95.7  166.3  64.4   53.0        2275
## 160         fwd         front       95.7  166.3  64.4   52.8        2275
## 161         fwd         front       95.7  166.3  64.4   53.0        2094
## 162         fwd         front       95.7  166.3  64.4   52.8        2122
## 163         fwd         front       95.7  166.3  64.4   52.8        2140
## 164         rwd         front       94.5  168.7  64.0   52.6        2169
## 165         rwd         front       94.5  168.7  64.0   52.6        2204
## 166         rwd         front       94.5  168.7  64.0   52.6        2265
## 167         rwd         front       94.5  168.7  64.0   52.6        2300
## 168         rwd         front       98.4  176.2  65.6   52.0        2540
## 169         rwd         front       98.4  176.2  65.6   52.0        2536
## 170         rwd         front       98.4  176.2  65.6   52.0        2551
## 171         rwd         front       98.4  176.2  65.6   52.0        2679
## 172         rwd         front       98.4  176.2  65.6   52.0        2714
## 173         rwd         front       98.4  176.2  65.6   53.0        2975
## 174         fwd         front      102.4  175.6  66.5   54.9        2326
## 175         fwd         front      102.4  175.6  66.5   54.9        2480
## 176         fwd         front      102.4  175.6  66.5   53.9        2414
## 177         fwd         front      102.4  175.6  66.5   54.9        2414
## 178         fwd         front      102.4  175.6  66.5   53.9        2458
## 179         rwd         front      102.9  183.5  67.7   52.0        2976
## 180         rwd         front      102.9  183.5  67.7   52.0        3016
## 181         rwd         front      104.5  187.8  66.5   54.1        3131
## 182         rwd         front      104.5  187.8  66.5   54.1        3151
## 183         fwd         front       97.3  171.7  65.5   55.7        2261
## 184         fwd         front       97.3  171.7  65.5   55.7        2209
## 185         fwd         front       97.3  171.7  65.5   55.7        2264
## 186         fwd         front       97.3  171.7  65.5   55.7        2212
## 187         fwd         front       97.3  171.7  65.5   55.7        2275
## 188         fwd         front       97.3  171.7  65.5   55.7        2319
## 189         fwd         front       97.3  171.7  65.5   55.7        2300
## 190         fwd         front       94.5  159.3  64.2   55.6        2254
## 191         fwd         front       94.5  165.7  64.0   51.4        2221
## 192         fwd         front      100.4  180.2  66.9   55.1        2661
## 193         fwd         front      100.4  180.2  66.9   55.1        2579
## 194         fwd         front      100.4  183.1  66.9   55.1        2563
## 195         rwd         front      104.3  188.8  67.2   56.2        2912
## 196         rwd         front      104.3  188.8  67.2   57.5        3034
## 197         rwd         front      104.3  188.8  67.2   56.2        2935
## 198         rwd         front      104.3  188.8  67.2   57.5        3042
## 199         rwd         front      104.3  188.8  67.2   56.2        3045
## 200         rwd         front      104.3  188.8  67.2   57.5        3157
```

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## 201         rwd          front     109.1  188.8  68.9   55.5       2952
## 202         rwd          front     109.1  188.8  68.8   55.5       3049
## 203         rwd          front     109.1  188.8  68.9   55.5       3012
## 204         rwd          front     109.1  188.8  68.9   55.5       3217
## 205         rwd          front     109.1  188.8  68.9   55.5       3062
##     engineType nrCylinds engineSize fuelSystem  bore stroke compressionRatio
## 1         dohc      four        130       mpfi  3.47   2.68             9.00
## 2         dohc      four        130       mpfi  3.47   2.68             9.00
## 3         ohcv       six        152       mpfi  2.68   3.47             9.00
## 4          ohc      four        109       mpfi  3.19   3.40            10.00
## 5          ohc      five        136       mpfi  3.19   3.40             8.00
## 6          ohc      five        136       mpfi  3.19   3.40             8.50
## 7          ohc      five        136       mpfi  3.19   3.40             8.50
## 8          ohc      five        136       mpfi  3.19   3.40             8.50
## 9          ohc      five        131       mpfi  3.13   3.40             8.30
## 10         ohc      five        131       mpfi  3.13   3.40             7.00
## 11         ohc      four        108       mpfi  3.50   2.80             8.80
## 12         ohc      four        108       mpfi  3.50   2.80             8.80
## 13         ohc       six        164       mpfi  3.31   3.19             9.00
## 14         ohc       six        164       mpfi  3.31   3.19             9.00
## 15         ohc       six        164       mpfi  3.31   3.19             9.00
## 16         ohc       six        209       mpfi  3.62   3.39             8.00
## 17         ohc       six        209       mpfi  3.62   3.39             8.00
## 18         ohc       six        209       mpfi  3.62   3.39             8.00
## 19           l     three         61       2bbl  2.91   3.03             9.50
## 20         ohc      four         90       2bbl  3.03   3.11             9.60
## 21         ohc      four         90       2bbl  3.03   3.11             9.60
## 22         ohc      four         90       2bbl  2.97   3.23             9.41
## 23         ohc      four         90       2bbl  2.97   3.23             9.40
## 24         ohc      four         98       mpfi  3.03   3.39             7.60
## 25         ohc      four         90       2bbl  2.97   3.23             9.40
## 26         ohc      four         90       2bbl  2.97   3.23             9.40
## 27         ohc      four         90       2bbl  2.97   3.23             9.40
## 28         ohc      four         98       mpfi  3.03   3.39             7.60
## 29         ohc      four        122       2bbl  3.34   3.46             8.50
## 30         ohc      four        156        mfi  3.60   3.90             7.00
## 31         ohc      four         92       1bbl  2.91   3.41             9.60
## 32         ohc      four         92       1bbl  2.91   3.41             9.20
## 33         ohc      four         79       1bbl  2.91   3.07            10.10
## 34         ohc      four         92       1bbl  2.91   3.41             9.20
## 35         ohc      four         92       1bbl  2.91   3.41             9.20
## 36         ohc      four         92       1bbl  2.91   3.41             9.20
## 37         ohc      four         92       1bbl  2.92   3.41             9.20
## 38         ohc      four        110       1bbl  3.15   3.58             9.00
## 39         ohc      four        110       1bbl  3.15   3.58             9.00
## 40         ohc      four        110       1bbl  3.15   3.58             9.00
## 41         ohc      four        110       1bbl  3.15   3.58             9.00
## 42         ohc      four        110       mpfi  3.15   3.58             9.00
## 43         ohc      four        110       2bbl  3.15   3.58             9.10
## 44         ohc      four        111       2bbl  3.31   3.23             8.50
## 45         ohc      four         90       2bbl  3.03   3.11             9.60
## 46         ohc      four         90       2bbl  3.03   3.11             9.60
## 47         ohc      four        119       spfi  3.43   3.23             9.20
## 48        dohc       six        258       mpfi  3.63   4.17             8.10
```

```
## 49        dohc       six        258       mpfi  3.63   4.17            8.10
## 50        ohcv    twelve        326       mpfi  3.54   2.76           11.50
## 51         ohc      four         91       2bbl  3.03   3.15            9.00
## 52         ohc      four         91       2bbl  3.03   3.15            9.00
## 53         ohc      four         91       2bbl  3.03   3.15            9.00
## 54         ohc      four         91       2bbl  3.03   3.15            9.00
## 55         ohc      four         91       2bbl  3.08   3.15            9.00
## 56       rotor       two         70       4bbl 31.00  25.00            9.40
## 57       rotor       two         70       4bbl 31.00  25.00            9.40
## 58       rotor       two         70       4bbl 31.00  25.00            9.40
## 59       rotor       two         80       mpfi 31.00  25.00            9.40
## 60         ohc      four        122       2bbl  3.39   3.39            8.60
## 61         ohc      four        122       2bbl  3.39   3.39            8.60
## 62         ohc      four        122       2bbl  3.39   3.39            8.60
## 63         ohc      four        122       2bbl  3.39   3.39            8.60
## 64         ohc      four        122        idi  3.39   3.39           22.70
## 65         ohc      four        122       2bbl  3.39   3.39            8.60
## 66         ohc      four        140       mpfi  3.76   3.16            8.00
## 67         ohc      four        134        idi  3.43   3.64           22.00
## 68         ohc      five        183        idi  3.58   3.64           21.50
## 69         ohc      five        183        idi  3.58   3.64           21.50
## 70         ohc      five        183        idi  3.58   3.64           21.50
## 71         ohc      five        183        idi  3.58   3.64           21.50
## 72        ohcv     eight        234       mpfi  3.46   3.10            8.30
## 73        ohcv     eight        234       mpfi  3.46   3.10            8.30
## 74        ohcv     eight        308       mpfi  3.80   3.35            8.00
## 75        ohcv     eight        304       mpfi  3.80   3.35            8.00
## 76         ohc      four        140       mpfi  3.78   3.12            8.00
## 77         ohc      four         92       2bbl  2.97   3.23            9.40
## 78         ohc      four         92       2bbl  2.97   3.23            9.40
## 79         ohc      four         92       2bbl  2.97   3.23            9.40
## 80         ohc      four         98       spdi  3.03   3.39            7.60
## 81         ohc      four        110       spdi  3.17   3.46            7.50
## 82         ohc      four        122       2bbl  3.35   3.46            8.50
## 83         ohc      four        156       spdi  3.58   3.86            7.00
## 84         ohc      four        156       spdi  3.59   3.86            7.00
## 85         ohc      four        156       spdi  3.59   3.86            7.00
## 86         ohc      four        122       2bbl  3.35   3.46            8.50
## 87         ohc      four        122       2bbl  3.35   3.46            8.50
## 88         ohc      four        110       spdi  3.17   3.46            7.50
## 89         ohc      four        110       spdi  3.17   3.46            7.50
## 90         ohc      four         97       2bbl  3.15   3.29            9.40
## 91         ohc      four        103        idi  2.99   3.47           21.90
## 92         ohc      four         97       2bbl  3.15   3.29            9.40
## 93         ohc      four         97       2bbl  3.15   3.29            9.40
## 94         ohc      four         97       2bbl  3.15   3.29            9.40
## 95         ohc      four         97       2bbl  3.15   3.29            9.40
## 96         ohc      four         97       2bbl  3.15   3.29            9.40
## 97         ohc      four         97       2bbl  3.15   3.29            9.40
## 98         ohc      four         97       2bbl  3.15   3.29            9.40
## 99         ohc      four         97       2bbl  3.15   3.29            9.40
## 100        ohc      four        120       2bbl  3.33   3.47            8.50
## 101        ohc      four        120       2bbl  3.33   3.47            8.50
## 102       ohcv       six        181       mpfi  3.43   3.27            9.00
```

```
## 103       ohcv       six        181       mpfi  3.43   3.27            9.00
## 104       ohcv       six        181       mpfi  3.43   3.27            9.00
## 105       ohcv       six        181       mpfi  3.43   3.27            9.00
## 106       ohcv       six        181       mpfi  3.43   3.27            7.80
## 107       ohcv       six        181       mpfi  3.43   3.27            9.00
## 108          l      four        120       mpfi  3.46   3.19            8.40
## 109          l      four        152        idi  3.70   3.52           21.00
## 110          l      four        120       mpfi  3.46   3.19            8.40
## 111          l      four        152        idi  3.70   3.52           21.00
## 112          l      four        120       mpfi  3.46   2.19            8.40
## 113          l      four        152        idi  3.70   3.52           21.00
## 114          l      four        120       mpfi  3.46   2.19            8.40
## 115          l      four        152        idi  3.70   3.52           21.00
## 116          l      four        120       mpfi  3.46   3.19            8.40
## 117          l      four        152        idi  3.70   3.52           21.00
## 118          l      four        134       mpfi  3.61   3.21            7.00
## 119        ohc      four         90       2bbl  2.97   3.23            9.40
## 120        ohc      four         98       spdi  3.03   3.39            7.60
## 121        ohc      four         90       2bbl  2.97   3.23            9.40
## 122        ohc      four         90       2bbl  2.97   3.23            9.40
## 123        ohc      four         98       2bbl  2.97   3.23            9.40
## 124        ohc      four        122       2bbl  3.35   3.46            8.50
## 125        ohc      four        156       spdi  3.59   3.86            7.00
## 126        ohc      four        151       mpfi  3.94   3.11            9.50
## 127       ohcf       six        194       mpfi  3.74   2.90            9.50
## 128       ohcf       six        194       mpfi  3.74   2.90            9.50
## 129       ohcf       six        194       mpfi  3.74   2.90            9.50
## 130      dohcv     eight        203       mpfi  3.94   3.11           10.00
## 131        ohc      four        132       mpfi  3.46   3.90            8.70
## 132        ohc      four        132       mpfi  3.46   3.90            8.70
## 133        ohc      four        121       mpfi  3.54   3.07            9.31
## 134        ohc      four        121       mpfi  3.54   3.07            9.30
## 135        ohc      four        121       mpfi  2.54   2.07            9.30
## 136        ohc      four        121       mpfi  3.54   3.07            9.30
## 137       dohc      four        121       mpfi  3.54   3.07            9.00
## 138       dohc      four        121       mpfi  3.54   3.07            9.00
## 139       ohcf      four         97       2bbl  3.62   2.36            9.00
## 140       ohcf      four        108       2bbl  3.62   2.64            8.70
## 141       ohcf      four        108       2bbl  3.62   2.64            8.70
## 142       ohcf      four        108       2bbl  3.62   2.64            9.50
## 143       ohcf      four        108       2bbl  3.62   2.64            9.50
## 144       ohcf      four        108       mpfi  3.62   2.64            9.00
## 145       ohcf      four        108       2bbl  3.62   2.64            9.00
## 146       ohcf      four        108       mpfi  3.62   2.64            7.70
## 147       ohcf      four        108       2bbl  3.62   2.64            9.00
## 148       ohcf      four        108       mpfi  3.62   2.64            9.00
## 149       ohcf      four        108       2bbl  3.62   2.64            9.00
## 150       ohcf      four        108       mpfi  3.62   2.64            7.70
## 151        ohc      four         92       2bbl  3.05   3.03            9.00
## 152        ohc      four         92       2bbl  3.05   3.03            9.00
## 153        ohc      four         92       2bbl  3.05   3.03            9.00
## 154        ohc      four         92       2bbl  3.05   3.03            9.00
## 155        ohc      four         92       2bbl  3.05   3.03            9.00
## 156        ohc      four         92       2bbl  3.05   3.03            9.00
```

```
## 157        ohc      four         98       2bbl  3.19   3.03             9.00
## 158        ohc      four         98       2bbl  3.19   3.03             9.00
## 159        ohc      four        110        idi  3.27   3.35            22.50
## 160        ohc      four        110        idi  3.27   3.35            22.50
## 161        ohc      four         98       2bbl  3.19   3.03             9.00
## 162        ohc      four         98       2bbl  3.19   3.03             9.00
## 163        ohc      four         98       2bbl  3.19   3.03             9.00
## 164        ohc      four         98       2bbl  3.19   3.03             9.00
## 165        ohc      four         98       2bbl  3.19   3.03             9.00
## 166       dohc      four         98       mpfi  3.24   3.08             9.40
## 167       dohc      four         98       mpfi  3.24   3.08             9.40
## 168        ohc      four        146       mpfi  3.62   3.50             9.30
## 169        ohc      four        146       mpfi  3.62   3.50             9.30
## 170        ohc      four        146       mpfi  3.62   3.50             9.30
## 171        ohc      four        146       mpfi  3.62   3.50             9.30
## 172        ohc      four        146       mpfi  3.62   3.50             9.30
## 173        ohc      four        146       mpfi  3.62   3.50             9.30
## 174        ohc      four        122       mpfi  3.31   3.54             8.70
## 175        ohc      four        110        idi  3.27   3.35            22.50
## 176        ohc      four        122       mpfi  3.31   3.54             8.70
## 177        ohc      four        122       mpfi  3.31   3.54             8.70
## 178        ohc      four        122       mpfi  3.31   3.54             8.70
## 179       dohc       six        171       mpfi  3.27   3.35             9.30
## 180       dohc       six        171       mpfi  3.27   3.35             9.30
## 181       dohc       six        171       mpfi  3.27   3.35             9.20
## 182       dohc       six        161       mpfi  3.27   3.35             9.20
## 183        ohc      four         97        idi  3.01   3.40            23.00
## 184        ohc      four        109       mpfi  3.19   3.40             9.00
## 185        ohc      four         97        idi  3.01   3.40            23.00
## 186        ohc      four        109       mpfi  3.19   3.40             9.00
## 187        ohc      four        109       mpfi  3.19   3.40             9.00
## 188        ohc      four         97        idi  3.01   3.40            23.00
## 189        ohc      four        109       mpfi  3.19   3.40            10.00
## 190        ohc      four        109       mpfi  3.19   3.40             8.50
## 191        ohc      four        109       mpfi  3.19   3.40             8.50
## 192        ohc      five        136       mpfi  3.19   3.40             8.50
## 193        ohc      four         97        idi  3.01   3.40            23.00
## 194        ohc      four        109       mpfi  3.19   3.40             9.00
## 195        ohc      four        141       mpfi  3.78   3.15             9.50
## 196        ohc      four        141       mpfi  3.78   3.15             9.50
## 197        ohc      four        141       mpfi  3.78   3.15             9.50
## 198        ohc      four        141       mpfi  3.78   3.15             9.50
## 199        ohc      four        130       mpfi  3.62   3.15             7.50
## 200        ohc      four        130       mpfi  3.62   3.15             7.50
## 201        ohc      four        141       mpfi  3.78   3.15             9.50
## 202        ohc      four        141       mpfi  3.78   3.15             8.70
## 203       ohcv       six        173       mpfi  3.58   2.87             8.80
## 204        ohc       six        145        idi  3.01   3.40            23.00
## 205        ohc      four        141       mpfi  3.78   3.15             9.50
##     horsePower peakRpm cityMpg highwayMpg price
## 1          111    5000      21         27 13495
## 2          111    5000      21         27 16500
## 3          154    5000      19         26 16500
## 4          102    5500      24         30 13950
```

```
## 5          115    5500       18          22 17450
## 6          110    5500       19          25 15250
## 7          110    5500       19          25 17710
## 8          110    5500       19          25 18920
## 9          140    5500       17          20 23875
## 10         160    5500       16          22     8
## 11         101    5800       23          29 16430
## 12         101    5800       23          29 16925
## 13         121    4250       21          28 20970
## 14         121    4250       21          28 21105
## 15         121    4250       20          25 24565
## 16         182    5400       16          22 30760
## 17         182    5400       16          22 41315
## 18         182    5400       15          20 36880
## 19          48    5100       47          53  5151
## 20          70    5400       38          43  6295
## 21          70    5400       38          43  6575
## 22          68    5500       37          41  5572
## 23          68    5500       31          38  6377
## 24         102    5500       24          30  7957
## 25          68    5500       31          38  6229
## 26          68    5500       31          38  6692
## 27          68    5500       31          38  7609
## 28         102    5500       24          30  8558
## 29          88    5000       24          30  8921
## 30         145    5000       19          24 12964
## 31          58    4800       49          54  6479
## 32          76    6000       31          38  6855
## 33          60    5500       38          42  5399
## 34          76    6000       30          34  6529
## 35          76    6000       30          34  7129
## 36          76    6000       30          34  7295
## 37          76    6000       30          34  7295
## 38          86    5800       27          33  7895
## 39          86    5800       27          33  9095
## 40          86    5800       27          33  8845
## 41          86    5800       27          33 10295
## 42         101    5800       24          28 12945
## 43         100    5500       25          31 10345
## 44          78    4800       24          29  6785
## 45          70    5400       38          43     8
## 46          70    5400       38          43     8
## 47          90    5000       24          29 11048
## 48         176    4750       15          19 32250
## 49         176    4750       15          19 35550
## 50         262    5000       13          17 36000
## 51          68    5000       30          31  5195
## 52          68    5000       31          38  6095
## 53          68    5000       31          38  6795
## 54          68    5000       31          38  6695
## 55          68    5000       31          38  7395
## 56         101    6000       17          23 10945
## 57         101    6000       17          23 11845
## 58         101    6000       17          23 13645
```

```
## 59          135    6000       16          23 15645
## 60           84    4800       26          32  8845
## 61           84    4800       26          32  8495
## 62           84    4800       26          32 10595
## 63           84    4800       26          32 10245
## 64           64    4650       36          42 10795
## 65           84    4800       26          32 11245
## 66          120    5000       19          27 18280
## 67           72    4200       31          39 18344
## 68          123    4350       22          25 25552
## 69          123    4350       22          25 28248
## 70          123    4350       22          25 28176
## 71          123    4350       22          25 31600
## 72          155    4750       16          18 34184
## 73          155    4750       16          18 35056
## 74          184    4500       14          16 40960
## 75          184    4500       14          16 45400
## 76          175    5000       19          24 16503
## 77           68    5500       37          41  5389
## 78           68    5500       31          38  6189
## 79           68    5500       31          38  6669
## 80          102    5500       24          30  7689
## 81          116    5500       23          30  9959
## 82           88    5000       25          32  8499
## 83          145    5000       19          24 12629
## 84          145    5000       19          24 14869
## 85          145    5000       19          24 14489
## 86           88    5000       25          32  6989
## 87           88    5000       25          32  8189
## 88          116    5500       23          30  9279
## 89          116    5500       23          30  9279
## 90           69    5200       31          37  5499
## 91           55    4800       45          50  7099
## 92           69    5200       31          37  6649
## 93           69    5200       31          37  6849
## 94           69    5200       31          37  7349
## 95           69    5200       31          37  7299
## 96           69    5200       31          37  7799
## 97           69    5200       31          37  7499
## 98           69    5200       31          37  7999
## 99           69    5200       31          37  8249
## 100          97    5200       27          34  8949
## 101          97    5200       27          34  9549
## 102         152    5200       17          22 13499
## 103         152    5200       17          22 14399
## 104         152    5200       19          25 13499
## 105         160    5200       19          25 17199
## 106         200    5200       17          23 19699
## 107         160    5200       19          25 18399
## 108          97    5000       19          24 11900
## 109          95    4150       28          33 13200
## 110          97    5000       19          24 12440
## 111          95    4150       25          25 13860
## 112          95    5000       19          24 15580
```

```
## 113          95    4150       28          33 16900
## 114          95    5000       19          24 16695
## 115          95    4150       25          25 17075
## 116          97    5000       19          24 16630
## 117          95    4150       28          33 17950
## 118         142    5600       18          24 18150
## 119          68    5500       37          41  5572
## 120         102    5500       24          30  7957
## 121          68    5500       31          38  6229
## 122          68    5500       31          38  6692
## 123          68    5500       31          38  7609
## 124          88    5000       24          30  8921
## 125         145    5000       19          24 12764
## 126         143    5500       19          27 22018
## 127         207    5900       17          25 32528
## 128         207    5900       17          25 34028
## 129         207    5900       17          25 37028
## 130         288    5750       17          28     8
## 131           9      17       23          31  9295
## 132           9      17       23          31  9895
## 133         110    5250       21          28 11850
## 134         110    5250       21          28 12170
## 135         110    5250       21          28 15040
## 136         110    5250       21          28 15510
## 137         160    5500       19          26 18150
## 138         160    5500       19          26 18620
## 139          69    4900       31          36  5118
## 140          73    4400       26          31  7053
## 141          73    4400       26          31  7603
## 142          82    4800       32          37  7126
## 143          82    4400       28          33  7775
## 144          94    5200       26          32  9960
## 145          82    4800       24          25  9233
## 146         111    4800       24          29 11259
## 147          82    4800       28          32  7463
## 148          94    5200       25          31 10198
## 149          82    4800       23          29  8013
## 150         111    4800       23          23 11694
## 151          62    4800       35          39  5348
## 152          62    4800       31          38  6338
## 153          62    4800       31          38  6488
## 154          62    4800       31          37  6918
## 155          62    4800       27          32  7898
## 156          62    4800       27          32  8778
## 157          70    4800       30          37  6938
## 158          70    4800       30          37  7198
## 159          56    4500       34          36  7898
## 160          56    4500       38          47  7788
## 161          70    4800       38          47  7738
## 162          70    4800       28          34  8358
## 163          70    4800       28          34  9258
## 164          70    4800       29          34  8058
## 165          70    4800       29          34  8238
## 166         112    6600       26          29  9298
```

```
## 167        112    6600      26          29  9538
## 168        116    4800      24          30  8449
## 169        116    4800      24          30  9639
## 170        116    4800      24          30  9989
## 171        116    4800      24          30 11199
## 172        116    4800      24          30 11549
## 173        116    4800      24          30 17669
## 174         92    4200      29          34  8948
## 175         73    4500      30          33 10698
## 176         92    4200      27          32  9988
## 177         92    4200      27          32 10898
## 178         92    4200      27          32 11248
## 179        161    5200      20          24 16558
## 180        161    5200      19          24 15998
## 181        156    5200      20          24 15690
## 182        156    5200      19          24 15750
## 183         52    4800      37          46  7775
## 184         85    5250      27          34  7975
## 185         52    4800      37          46  7995
## 186         85    5250      27          34  8195
## 187         85    5250      27          34  8495
## 188         68    4500      37          42  9495
## 189        100    5500      26          32  9995
## 190         90    5500      24          29 11595
## 191         90    5500      24          29  9980
## 192        110    5500      19          24 13295
## 193         68    4500      33          38 13845
## 194         88    5500      25          31 12290
## 195        114    5400      23          28 12940
## 196        114    5400      23          28 13415
## 197        114    5400      24          28 15985
## 198        114    5400      24          28 16515
## 199        162    5100      17          22 18420
## 200        162    5100      17          22 18950
## 201        114    5400      23          28 16845
## 202        160    5300      19          25 19045
## 203        134    5500      18          23 21485
## 204        106    4800      26          27 22470
## 205        114    5400      19          25 22625
```

¿Hay casos duplicados? Consejo: utilice las funciones distinct() y count()

```
# Identifica los casos duplicados en el dataframe
duplicados <- dfH[duplicated(dfH),]
# En caso de haber duplicados se las puede eliminar con la funcion distintct()

# Cuenta los casos duplicados para todas las columnas
contDuplicados <- count(duplicados, across(everything()))
# Cuenta la frecuencia de aparicion de cada combinacion de valores en todas las columnas

# Imprime los cados duplicados y su contador
print(duplicados)
```

```
##  [1] symb             normLoss         make             fuelType
```

```
##  [5] aspiration       nDoors           bodyStyle        driveWheels
##  [9] engineLocation   wheelBase        length           width
## [13] height           curbWeight       engineType       nrCylinds
## [17] engineSize       fuelSystem       bore             stroke
## [21] compressionRatio horsePower       peakRpm          cityMpg
## [25] highwayMpg       price
## <0 rows> (or 0-length row.names)
```

```
print(contDuplicados)
```

```
##  [1] symb             normLoss         make             fuelType
##  [5] aspiration       nDoors           bodyStyle        driveWheels
##  [9] engineLocation   wheelBase        length           width
## [13] height           curbWeight       engineType       nrCylinds
## [17] engineSize       fuelSystem       bore             stroke
## [21] compressionRatio horsePower       peakRpm          cityMpg
## [25] highwayMpg       price            n
## <0 rows> (or 0-length row.names)
```

2. Data Pre-Processing

2. Cargue el paquete dlookr. Utilice el mismo conjunto de datos de seguro de automóvil anterior y aplique lo siguiente transformaciones al atributo price. Sé crítico con los resultados obtenidos.

(a) Aplicar normalización basada en rangos y normalización de Z-score.

```
# Convertir el objeto en un dataframe
dfNorm <- as.data.frame(carIns)

dfNorm <- dfNorm %>%
  mutate(
          # Aplica la normalización basada en rangos
          precioNormRango = (price - min(price, na.rm = TRUE)) / (max(price, na.rm = TRUE) - min(price,
          # Aplica la normalización Z-score
          precioNormZscore = (price - mean(price, na.rm = TRUE)) / sd(price, na.rm = TRUE)
)

# Imprime el nuevo dataframe
print(dfNorm)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      3       NA   alfa-romero      gas        std    two convertible
## 2      3       NA   alfa-romero      gas        std    two convertible
## 3      1       NA   alfa-romero      gas        std    two   hatchback
## 4      2      164          audi      gas        std   four       sedan
## 5      2      164          audi      gas        std   four       sedan
## 6      2       NA          audi      gas        std    two       sedan
## 7      1      158          audi      gas        std   four       sedan
## 8      1       NA          audi      gas        std   four       wagon
## 9      1      158          audi      gas      turbo   four       sedan
## 10     0       NA          audi      gas      turbo    two   hatchback
## 11     2      192           bmw      gas        std    two       sedan
## 12     0      192           bmw      gas        std   four       sedan
## 13     0      188           bmw      gas        std    two       sedan
```

```
## 14     0      188          bmw      gas        std   four       sedan
## 15     1       NA          bmw      gas        std   four       sedan
## 16     0       NA          bmw      gas        std   four       sedan
## 17     0       NA          bmw      gas        std    two       sedan
## 18     0       NA          bmw      gas        std   four       sedan
## 19     2      121    chevrolet      gas        std    two   hatchback
## 20     1       98    chevrolet      gas        std    two   hatchback
## 21     0       81    chevrolet      gas        std   four       sedan
## 22     1      118        dodge      gas        std    two   hatchback
## 23     1      118        dodge      gas        std    two   hatchback
## 24     1      118        dodge      gas      turbo    two   hatchback
## 25     1      148        dodge      gas        std   four   hatchback
## 26     1      148        dodge      gas        std   four       sedan
## 27     1      148        dodge      gas        std   four       sedan
## 28     1      148        dodge      gas      turbo   <NA>       sedan
## 29    -1      110        dodge      gas        std   four       wagon
## 30     3      145        dodge      gas      turbo    two   hatchback
## 31     2      137        honda      gas        std    two   hatchback
## 32     2      137        honda      gas        std    two   hatchback
## 33     1      101        honda      gas        std    two   hatchback
## 34     1      101        honda      gas        std    two   hatchback
## 35     1      101        honda      gas        std    two   hatchback
## 36     0      110        honda      gas        std   four       sedan
## 37     0       78        honda      gas        std   four       wagon
## 38     0      106        honda      gas        std    two   hatchback
## 39     0      106        honda      gas        std    two   hatchback
## 40     0       85        honda      gas        std   four       sedan
## 41     0       85        honda      gas        std   four       sedan
## 42     0       85        honda      gas        std   four       sedan
## 43     1      107        honda      gas        std    two       sedan
## 44     0       NA        isuzu      gas        std   four       sedan
## 45     1       NA        isuzu      gas        std    two       sedan
## 46     0       NA        isuzu      gas        std   four       sedan
## 47     2       NA        isuzu      gas        std    two   hatchback
## 48     0      145       jaguar      gas        std   four       sedan
## 49     0       NA       jaguar      gas        std   four       sedan
## 50     0       NA       jaguar      gas        std    two       sedan
## 51     1      104        mazda      gas        std    two   hatchback
## 52     1      104        mazda      gas        std    two   hatchback
## 53     1      104        mazda      gas        std    two   hatchback
## 54     1      113        mazda      gas        std   four       sedan
## 55     1      113        mazda      gas        std   four       sedan
## 56     3      150        mazda      gas        std    two   hatchback
## 57     3      150        mazda      gas        std    two   hatchback
## 58     3      150        mazda      gas        std    two   hatchback
## 59     3      150        mazda      gas        std    two   hatchback
## 60     1      129        mazda      gas        std    two   hatchback
## 61     0      115        mazda      gas        std   four       sedan
## 62     1      129        mazda      gas        std    two   hatchback
## 63     0      115        mazda      gas        std   four       sedan
## 64     0       NA        mazda   diesel        std   <NA>       sedan
## 65     0      115        mazda      gas        std   four   hatchback
## 66     0      118        mazda      gas        std   four       sedan
## 67     0       NA        mazda   diesel        std   four       sedan
```

```
## 68    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 69    -1       93 mercedes-benz   diesel      turbo   four       wagon
## 70     0       93 mercedes-benz   diesel      turbo    two     hardtop
## 71    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 72    -1       NA mercedes-benz      gas        std   four       sedan
## 73     3      142 mercedes-benz      gas        std    two convertible
## 74     0       NA mercedes-benz      gas        std   four       sedan
## 75     1       NA mercedes-benz      gas        std    two     hardtop
## 76     1       NA       mercury      gas      turbo    two   hatchback
## 77     2      161    mitsubishi      gas        std    two   hatchback
## 78     2      161    mitsubishi      gas        std    two   hatchback
## 79     2      161    mitsubishi      gas        std    two   hatchback
## 80     1      161    mitsubishi      gas      turbo    two   hatchback
## 81     3      153    mitsubishi      gas      turbo    two   hatchback
## 82     3      153    mitsubishi      gas        std    two   hatchback
## 83     3       NA    mitsubishi      gas      turbo    two   hatchback
## 84     3       NA    mitsubishi      gas      turbo    two   hatchback
## 85     3       NA    mitsubishi      gas      turbo    two   hatchback
## 86     1      125    mitsubishi      gas        std   four       sedan
## 87     1      125    mitsubishi      gas        std   four       sedan
## 88     1      125    mitsubishi      gas      turbo   four       sedan
## 89    -1      137    mitsubishi      gas        std   four       sedan
## 90     1      128        nissan      gas        std    two       sedan
## 91     1      128        nissan   diesel        std    two       sedan
## 92     1      128        nissan      gas        std    two       sedan
## 93     1      122        nissan      gas        std   four       sedan
## 94     1      103        nissan      gas        std   four       wagon
## 95     1      128        nissan      gas        std    two       sedan
## 96     1      128        nissan      gas        std    two   hatchback
## 97     1      122        nissan      gas        std   four       sedan
## 98     1      103        nissan      gas        std   four       wagon
## 99     2      168        nissan      gas        std    two     hardtop
## 100    0      106        nissan      gas        std   four   hatchback
## 101    0      106        nissan      gas        std   four       sedan
## 102    0      128        nissan      gas        std   four       sedan
## 103    0      108        nissan      gas        std   four       wagon
## 104    0      108        nissan      gas        std   four       sedan
## 105    3      194        nissan      gas        std    two   hatchback
## 106    3      194        nissan      gas      turbo    two   hatchback
## 107    1      231        nissan      gas        std    two   hatchback
## 108    0      161        peugot      gas        std   four       sedan
## 109    0      161        peugot   diesel      turbo   four       sedan
## 110    0       NA        peugot      gas        std   four       wagon
## 111    0       NA        peugot   diesel      turbo   four       wagon
## 112    0      161        peugot      gas        std   four       sedan
## 113    0      161        peugot   diesel      turbo   four       sedan
## 114    0       NA        peugot      gas        std   four       wagon
## 115    0       NA        peugot   diesel      turbo   four       wagon
## 116    0      161        peugot      gas        std   four       sedan
## 117    0      161        peugot   diesel      turbo   four       sedan
## 118    0      161        peugot      gas      turbo   four       sedan
## 119    1      119      plymouth      gas        std    two   hatchback
## 120    1      119      plymouth      gas      turbo    two   hatchback
## 121    1      154      plymouth      gas        std   four   hatchback
```

```
## 122    1      154      plymouth      gas        std   four       sedan
## 123    1      154      plymouth      gas        std   four       sedan
## 124   -1       74      plymouth      gas        std   four       wagon
## 125    3       NA      plymouth      gas      turbo    two   hatchback
## 126    3      186       porsche      gas        std    two   hatchback
## 127    3       NA       porsche      gas        std    two     hardtop
## 128    3       NA       porsche      gas        std    two     hardtop
## 129    3       NA       porsche      gas        std    two convertible
## 130    1       NA       porsche      gas        std    two   hatchback
## 131    0       NA       renault      gas        std   four       wagon
## 132    2       NA       renault      gas        std    two   hatchback
## 133    3      150          saab      gas        std    two   hatchback
## 134    2      104          saab      gas        std   four       sedan
## 135    3      150          saab      gas        std    two   hatchback
## 136    2      104          saab      gas        std   four       sedan
## 137    3      150          saab      gas      turbo    two   hatchback
## 138    2      104          saab      gas      turbo   four       sedan
## 139    2       83        subaru      gas        std    two   hatchback
## 140    2       83        subaru      gas        std    two   hatchback
## 141    2       83        subaru      gas        std    two   hatchback
## 142    0      102        subaru      gas        std   four       sedan
## 143    0      102        subaru      gas        std   four       sedan
## 144    0      102        subaru      gas        std   four       sedan
## 145    0      102        subaru      gas        std   four       sedan
## 146    0      102        subaru      gas      turbo   four       sedan
## 147    0       89        subaru      gas        std   four       wagon
## 148    0       89        subaru      gas        std   four       wagon
## 149    0       85        subaru      gas        std   four       wagon
## 150    0       85        subaru      gas      turbo   four       wagon
## 151    1       87        toyota      gas        std    two   hatchback
## 152    1       87        toyota      gas        std    two   hatchback
## 153    1       74        toyota      gas        std   four   hatchback
## 154    0       77        toyota      gas        std   four       wagon
## 155    0       81        toyota      gas        std   four       wagon
## 156    0       91        toyota      gas        std   four       wagon
## 157    0       91        toyota      gas        std   four       sedan
## 158    0       91        toyota      gas        std   four   hatchback
## 159    0       91        toyota   diesel        std   four       sedan
## 160    0       91        toyota   diesel        std   four   hatchback
## 161    0       91        toyota      gas        std   four       sedan
## 162    0       91        toyota      gas        std   four   hatchback
## 163    0       91        toyota      gas        std   four       sedan
## 164    1      168        toyota      gas        std    two       sedan
## 165    1      168        toyota      gas        std    two   hatchback
## 166    1      168        toyota      gas        std    two       sedan
## 167    1      168        toyota      gas        std    two   hatchback
## 168    2      134        toyota      gas        std    two     hardtop
## 169    2      134        toyota      gas        std    two     hardtop
## 170    2      134        toyota      gas        std    two   hatchback
## 171    2      134        toyota      gas        std    two     hardtop
## 172    2      134        toyota      gas        std    two   hatchback
## 173    2      134        toyota      gas        std    two convertible
## 174   -1       65        toyota      gas        std   four       sedan
## 175   -1       65        toyota   diesel      turbo   four       sedan
```

```
## 176   -1       65        toyota      gas        std   four   hatchback
## 177   -1       65        toyota      gas        std   four       sedan
## 178   -1       65        toyota      gas        std   four   hatchback
## 179    3      197        toyota      gas        std    two   hatchback
## 180    3      197        toyota      gas        std    two   hatchback
## 181   -1       90        toyota      gas        std   four       sedan
## 182   -1       NA        toyota      gas        std   four       wagon
## 183    2      122    volkswagen   diesel        std    two       sedan
## 184    2      122    volkswagen      gas        std    two       sedan
## 185    2       94    volkswagen   diesel        std   four       sedan
## 186    2       94    volkswagen      gas        std   four       sedan
## 187    2       94    volkswagen      gas        std   four       sedan
## 188    2       94    volkswagen   diesel      turbo   four       sedan
## 189    2       94    volkswagen      gas        std   four       sedan
## 190    3       NA    volkswagen      gas        std    two convertible
## 191    3      256    volkswagen      gas        std    two   hatchback
## 192    0       NA    volkswagen      gas        std   four       sedan
## 193    0       NA    volkswagen   diesel      turbo   four       sedan
## 194    0       NA    volkswagen      gas        std   four       wagon
## 195   -2      103         volvo      gas        std   four       sedan
## 196   -1       74         volvo      gas        std   four       wagon
## 197   -2      103         volvo      gas        std   four       sedan
## 198   -1       74         volvo      gas        std   four       wagon
## 199   -2      103         volvo      gas      turbo   four       sedan
## 200   -1       74         volvo      gas      turbo   four       wagon
## 201   -1       95         volvo      gas        std   four       sedan
## 202   -1       95         volvo      gas      turbo   four       sedan
## 203   -1       95         volvo      gas        std   four       sedan
## 204   -1       95         volvo   diesel      turbo   four       sedan
## 205   -1       95         volvo      gas      turbo   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           rwd          front      88.6  168.8  64.1   48.8       2548
## 2           rwd          front      88.6  168.8  64.1   48.8       2548
## 3           rwd          front      94.5  171.2  65.5   52.4       2823
## 4           fwd          front      99.8  176.6  66.2   54.3       2337
## 5           4wd          front      99.4  176.6  66.4   54.3       2824
## 6           fwd          front      99.8  177.3  66.3   53.1       2507
## 7           fwd          front     105.8  192.7  71.4   55.7       2844
## 8           fwd          front     105.8  192.7  71.4   55.7       2954
## 9           fwd          front     105.8  192.7  71.4   55.9       3086
## 10          4wd          front      99.5  178.2  67.9   52.0       3053
## 11          rwd          front     101.2  176.8  64.8   54.3       2395
## 12          rwd          front     101.2  176.8  64.8   54.3       2395
## 13          rwd          front     101.2  176.8  64.8   54.3       2710
## 14          rwd          front     101.2  176.8  64.8   54.3       2765
## 15          rwd          front     103.5  189.0  66.9   55.7       3055
## 16          rwd          front     103.5  189.0  66.9   55.7       3230
## 17          rwd          front     103.5  193.8  67.9   53.7       3380
## 18          rwd          front     110.0  197.0  70.9   56.3       3505
## 19          fwd          front      88.4  141.1  60.3   53.2       1488
## 20          fwd          front      94.5  155.9  63.6   52.0       1874
## 21          fwd          front      94.5  158.8  63.6   52.0       1909
## 22          fwd          front      93.7  157.3  63.8   50.8       1876
## 23          fwd          front      93.7  157.3  63.8   50.8       1876
```

```
## 24          fwd          front       93.7  157.3  63.8   50.8        2128
## 25          fwd          front       93.7  157.3  63.8   50.6        1967
## 26          fwd          front       93.7  157.3  63.8   50.6        1989
## 27          fwd          front       93.7  157.3  63.8   50.6        1989
## 28          fwd          front       93.7  157.3  63.8   50.6        2191
## 29          fwd          front      103.3  174.6  64.6   59.8        2535
## 30          fwd          front       95.9  173.2  66.3   50.2        2811
## 31          fwd          front       86.6  144.6  63.9   50.8        1713
## 32          fwd          front       86.6  144.6  63.9   50.8        1819
## 33          fwd          front       93.7  150.0  64.0   52.6        1837
## 34          fwd          front       93.7  150.0  64.0   52.6        1940
## 35          fwd          front       93.7  150.0  64.0   52.6        1956
## 36          fwd          front       96.5  163.4  64.0   54.5        2010
## 37          fwd          front       96.5  157.1  63.9   58.3        2024
## 38          fwd          front       96.5  167.5  65.2   53.3        2236
## 39          fwd          front       96.5  167.5  65.2   53.3        2289
## 40          fwd          front       96.5  175.4  65.2   54.1        2304
## 41          fwd          front       96.5  175.4  62.5   54.1        2372
## 42          fwd          front       96.5  175.4  65.2   54.1        2465
## 43          fwd          front       96.5  169.1  66.0   51.0        2293
## 44          rwd          front       94.3  170.7  61.8   53.5        2337
## 45          fwd          front       94.5  155.9  63.6   52.0        1874
## 46          fwd          front       94.5  155.9  63.6   52.0        1909
## 47          rwd          front       96.0  172.6  65.2   51.4        2734
## 48          rwd          front      113.0  199.6  69.6   52.8        4066
## 49          rwd          front      113.0  199.6  69.6   52.8        4066
## 50          rwd          front      102.0  191.7  70.6   47.8        3950
## 51          fwd          front       93.1  159.1  64.2   54.1        1890
## 52          fwd          front       93.1  159.1  64.2   54.1        1900
## 53          fwd          front       93.1  159.1  64.2   54.1        1905
## 54          fwd          front       93.1  166.8  64.2   54.1        1945
## 55          fwd          front       93.1  166.8  64.2   54.1        1950
## 56          rwd          front       95.3  169.0  65.7   49.6        2380
## 57          rwd          front       95.3  169.0  65.7   49.6        2380
## 58          rwd          front       95.3  169.0  65.7   49.6        2385
## 59          rwd          front       95.3  169.0  65.7   49.6        2500
## 60          fwd          front       98.8  177.8  66.5   53.7        2385
## 61          fwd          front       98.8  177.8  66.5   55.5        2410
## 62          fwd          front       98.8  177.8  66.5   53.7        2385
## 63          fwd          front       98.8  177.8  66.5   55.5        2410
## 64          fwd          front       98.8  177.8  66.5   55.5        2443
## 65          fwd          front       98.8  177.8  66.5   55.5        2425
## 66          rwd          front      104.9  175.0  66.1   54.4        2670
## 67          rwd          front      104.9  175.0  66.1   54.4        2700
## 68          rwd          front      110.0  190.9  70.3   56.5        3515
## 69          rwd          front      110.0  190.9  70.3   58.7        3750
## 70          rwd          front      106.7  187.5  70.3   54.9        3495
## 71          rwd          front      115.6  202.6  71.7   56.3        3770
## 72          rwd          front      115.6  202.6  71.7   56.5        3740
## 73          rwd          front       96.6  180.3  70.5   50.8        3685
## 74          rwd          front      120.9  208.1  71.7   56.7        3900
## 75          rwd          front      112.0  199.2  72.0   55.4        3715
## 76          rwd          front      102.7  178.4  68.0   54.8        2910
## 77          fwd          front       93.7  157.3  64.4   50.8        1918
```

```
## 78          fwd          front      93.7  157.3  64.4   50.8       1944
## 79          fwd          front      93.7  157.3  64.4   50.8       2004
## 80          fwd          front      93.0  157.3  63.8   50.8       2145
## 81          fwd          front      96.3  173.0  65.4   49.4       2370
## 82          fwd          front      96.3  173.0  65.4   49.4       2328
## 83          fwd          front      95.9  173.2  66.3   50.2       2833
## 84          fwd          front      95.9  173.2  66.3   50.2       2921
## 85          fwd          front      95.9  173.2  66.3   50.2       2926
## 86          fwd          front      96.3  172.4  65.4   51.6       2365
## 87          fwd          front      96.3  172.4  65.4   51.6       2405
## 88          fwd          front      96.3  172.4  65.4   51.6       2403
## 89          fwd          front      96.3  172.4  65.4   51.6       2403
## 90          fwd          front      94.5  165.3  63.8   54.5       1889
## 91          fwd          front      94.5  165.3  63.8   54.5       2017
## 92          fwd          front      94.5  165.3  63.8   54.5       1918
## 93          fwd          front      94.5  165.3  63.8   54.5       1938
## 94          fwd          front      94.5  170.2  63.8   53.5       2024
## 95          fwd          front      94.5  165.3  63.8   54.5       1951
## 96          fwd          front      94.5  165.6  63.8   53.3       2028
## 97          fwd          front      94.5  165.3  63.8   54.5       1971
## 98          fwd          front      94.5  170.2  63.8   53.5       2037
## 99          fwd          front      95.1  162.4  63.8   53.3       2008
## 100         fwd          front      97.2  173.4  65.2   54.7       2324
## 101         fwd          front      97.2  173.4  65.2   54.7       2302
## 102         fwd          front     100.4  181.7  66.5   55.1       3095
## 103         fwd          front     100.4  184.6  66.5   56.1       3296
## 104         fwd          front     100.4  184.6  66.5   55.1       3060
## 105         rwd          front      91.3  170.7  67.9   49.7       3071
## 106         rwd          front      91.3  170.7  67.9   49.7       3139
## 107         rwd          front      99.2  178.5  67.9   49.7       3139
## 108         rwd          front     107.9  186.7  68.4   56.7       3020
## 109         rwd          front     107.9  186.7  68.4   56.7       3197
## 110         rwd          front     114.2  198.9  68.4   58.7       3230
## 111         rwd          front     114.2  198.9  68.4   58.7       3430
## 112         rwd          front     107.9  186.7  68.4   56.7       3075
## 113         rwd          front     107.9  186.7  68.4   56.7       3252
## 114         rwd          front     114.2  198.9  68.4   56.7       3285
## 115         rwd          front     114.2  198.9  68.4   58.7       3485
## 116         rwd          front     107.9  186.7  68.4   56.7       3075
## 117         rwd          front     107.9  186.7  68.4   56.7       3252
## 118         rwd          front     108.0  186.7  68.3   56.0       3130
## 119         fwd          front      93.7  157.3  63.8   50.8       1918
## 120         fwd          front      93.7  157.3  63.8   50.8       2128
## 121         fwd          front      93.7  157.3  63.8   50.6       1967
## 122         fwd          front      93.7  167.3  63.8   50.8       1989
## 123         fwd          front      93.7  167.3  63.8   50.8       2191
## 124         fwd          front     103.3  174.6  64.6   59.8       2535
## 125         rwd          front      95.9  173.2  66.3   50.2       2818
## 126         rwd          front      94.5  168.9  68.3   50.2       2778
## 127         rwd           rear      89.5  168.9  65.0   51.6       2756
## 128         rwd           rear      89.5  168.9  65.0   51.6       2756
## 129         rwd           rear      89.5  168.9  65.0   51.6       2800
## 130         rwd          front      98.4  175.7  72.3   50.5       3366
## 131         fwd          front      96.1  181.5  66.5   55.2       2579
```

```
## 132        fwd         front      96.1  176.8  66.6   50.5       2460
## 133        fwd         front      99.1  186.6  66.5   56.1       2658
## 134        fwd         front      99.1  186.6  66.5   56.1       2695
## 135        fwd         front      99.1  186.6  66.5   56.1       2707
## 136        fwd         front      99.1  186.6  66.5   56.1       2758
## 137        fwd         front      99.1  186.6  66.5   56.1       2808
## 138        fwd         front      99.1  186.6  66.5   56.1       2847
## 139        fwd         front      93.7  156.9  63.4   53.7       2050
## 140        fwd         front      93.7  157.9  63.6   53.7       2120
## 141        4wd         front      93.3  157.3  63.8   55.7       2240
## 142        fwd         front      97.2  172.0  65.4   52.5       2145
## 143        fwd         front      97.2  172.0  65.4   52.5       2190
## 144        fwd         front      97.2  172.0  65.4   52.5       2340
## 145        4wd         front      97.0  172.0  65.4   54.3       2385
## 146        4wd         front      97.0  172.0  65.4   54.3       2510
## 147        fwd         front      97.0  173.5  65.4   53.0       2290
## 148        fwd         front      97.0  173.5  65.4   53.0       2455
## 149        4wd         front      96.9  173.6  65.4   54.9       2420
## 150        4wd         front      96.9  173.6  65.4   54.9       2650
## 151        fwd         front      95.7  158.7  63.6   54.5       1985
## 152        fwd         front      95.7  158.7  63.6   54.5       2040
## 153        fwd         front      95.7  158.7  63.6   54.5       2015
## 154        fwd         front      95.7  169.7  63.6   59.1       2280
## 155        4wd         front      95.7  169.7  63.6   59.1       2290
## 156        4wd         front      95.7  169.7  63.6   59.1       3110
## 157        fwd         front      95.7  166.3  64.4   53.0       2081
## 158        fwd         front      95.7  166.3  64.4   52.8       2109
## 159        fwd         front      95.7  166.3  64.4   53.0       2275
## 160        fwd         front      95.7  166.3  64.4   52.8       2275
## 161        fwd         front      95.7  166.3  64.4   53.0       2094
## 162        fwd         front      95.7  166.3  64.4   52.8       2122
## 163        fwd         front      95.7  166.3  64.4   52.8       2140
## 164        rwd         front      94.5  168.7  64.0   52.6       2169
## 165        rwd         front      94.5  168.7  64.0   52.6       2204
## 166        rwd         front      94.5  168.7  64.0   52.6       2265
## 167        rwd         front      94.5  168.7  64.0   52.6       2300
## 168        rwd         front      98.4  176.2  65.6   52.0       2540
## 169        rwd         front      98.4  176.2  65.6   52.0       2536
## 170        rwd         front      98.4  176.2  65.6   52.0       2551
## 171        rwd         front      98.4  176.2  65.6   52.0       2679
## 172        rwd         front      98.4  176.2  65.6   52.0       2714
## 173        rwd         front      98.4  176.2  65.6   53.0       2975
## 174        fwd         front     102.4  175.6  66.5   54.9       2326
## 175        fwd         front     102.4  175.6  66.5   54.9       2480
## 176        fwd         front     102.4  175.6  66.5   53.9       2414
## 177        fwd         front     102.4  175.6  66.5   54.9       2414
## 178        fwd         front     102.4  175.6  66.5   53.9       2458
## 179        rwd         front     102.9  183.5  67.7   52.0       2976
## 180        rwd         front     102.9  183.5  67.7   52.0       3016
## 181        rwd         front     104.5  187.8  66.5   54.1       3131
## 182        rwd         front     104.5  187.8  66.5   54.1       3151
## 183        fwd         front      97.3  171.7  65.5   55.7       2261
## 184        fwd         front      97.3  171.7  65.5   55.7       2209
## 185        fwd         front      97.3  171.7  65.5   55.7       2264
```

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## 186         fwd          front      97.3  171.7  65.5   55.7       2212
## 187         fwd          front      97.3  171.7  65.5   55.7       2275
## 188         fwd          front      97.3  171.7  65.5   55.7       2319
## 189         fwd          front      97.3  171.7  65.5   55.7       2300
## 190         fwd          front      94.5  159.3  64.2   55.6       2254
## 191         fwd          front      94.5  165.7  64.0   51.4       2221
## 192         fwd          front     100.4  180.2  66.9   55.1       2661
## 193         fwd          front     100.4  180.2  66.9   55.1       2579
## 194         fwd          front     100.4  183.1  66.9   55.1       2563
## 195         rwd          front     104.3  188.8  67.2   56.2       2912
## 196         rwd          front     104.3  188.8  67.2   57.5       3034
## 197         rwd          front     104.3  188.8  67.2   56.2       2935
## 198         rwd          front     104.3  188.8  67.2   57.5       3042
## 199         rwd          front     104.3  188.8  67.2   56.2       3045
## 200         rwd          front     104.3  188.8  67.2   57.5       3157
## 201         rwd          front     109.1  188.8  68.9   55.5       2952
## 202         rwd          front     109.1  188.8  68.8   55.5       3049
## 203         rwd          front     109.1  188.8  68.9   55.5       3012
## 204         rwd          front     109.1  188.8  68.9   55.5       3217
## 205         rwd          front     109.1  188.8  68.9   55.5       3062
##     engineType nrCylinds engineSize fuelSystem bore stroke compressionRatio
## 1         dohc      four        130       mpfi 3.47   2.68             9.00
## 2         dohc      four        130       mpfi 3.47   2.68             9.00
## 3         ohcv       six        152       mpfi 2.68   3.47             9.00
## 4          ohc      four        109       mpfi 3.19   3.40            10.00
## 5          ohc      five        136       mpfi 3.19   3.40             8.00
## 6          ohc      five        136       mpfi 3.19   3.40             8.50
## 7          ohc      five        136       mpfi 3.19   3.40             8.50
## 8          ohc      five        136       mpfi 3.19   3.40             8.50
## 9          ohc      five        131       mpfi 3.13   3.40             8.30
## 10         ohc      five        131       mpfi 3.13   3.40             7.00
## 11         ohc      four        108       mpfi 3.50   2.80             8.80
## 12         ohc      four        108       mpfi 3.50   2.80             8.80
## 13         ohc       six        164       mpfi 3.31   3.19             9.00
## 14         ohc       six        164       mpfi 3.31   3.19             9.00
## 15         ohc       six        164       mpfi 3.31   3.19             9.00
## 16         ohc       six        209       mpfi 3.62   3.39             8.00
## 17         ohc       six        209       mpfi 3.62   3.39             8.00
## 18         ohc       six        209       mpfi 3.62   3.39             8.00
## 19           l     three         61       2bbl 2.91   3.03             9.50
## 20         ohc      four         90       2bbl 3.03   3.11             9.60
## 21         ohc      four         90       2bbl 3.03   3.11             9.60
## 22         ohc      four         90       2bbl 2.97   3.23             9.41
## 23         ohc      four         90       2bbl 2.97   3.23             9.40
## 24         ohc      four         98       mpfi 3.03   3.39             7.60
## 25         ohc      four         90       2bbl 2.97   3.23             9.40
## 26         ohc      four         90       2bbl 2.97   3.23             9.40
## 27         ohc      four         90       2bbl 2.97   3.23             9.40
## 28         ohc      four         98       mpfi 3.03   3.39             7.60
## 29         ohc      four        122       2bbl 3.34   3.46             8.50
## 30         ohc      four        156        mfi 3.60   3.90             7.00
## 31         ohc      four         92       1bbl 2.91   3.41             9.60
## 32         ohc      four         92       1bbl 2.91   3.41             9.20
## 33         ohc      four         79       1bbl 2.91   3.07            10.10
```

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## 34         ohc      four         92       1bbl 2.91   3.41            9.20
## 35         ohc      four         92       1bbl 2.91   3.41            9.20
## 36         ohc      four         92       1bbl 2.91   3.41            9.20
## 37         ohc      four         92       1bbl 2.92   3.41            9.20
## 38         ohc      four        110       1bbl 3.15   3.58            9.00
## 39         ohc      four        110       1bbl 3.15   3.58            9.00
## 40         ohc      four        110       1bbl 3.15   3.58            9.00
## 41         ohc      four        110       1bbl 3.15   3.58            9.00
## 42         ohc      four        110       mpfi 3.15   3.58            9.00
## 43         ohc      four        110       2bbl 3.15   3.58            9.10
## 44         ohc      four        111       2bbl 3.31   3.23            8.50
## 45         ohc      four         90       2bbl 3.03   3.11            9.60
## 46         ohc      four         90       2bbl 3.03   3.11            9.60
## 47         ohc      four        119       spfi 3.43   3.23            9.20
## 48        dohc       six        258       mpfi 3.63   4.17            8.10
## 49        dohc       six        258       mpfi 3.63   4.17            8.10
## 50        ohcv    twelve        326       mpfi 3.54   2.76           11.50
## 51         ohc      four         91       2bbl 3.03   3.15            9.00
## 52         ohc      four         91       2bbl 3.03   3.15            9.00
## 53         ohc      four         91       2bbl 3.03   3.15            9.00
## 54         ohc      four         91       2bbl 3.03   3.15            9.00
## 55         ohc      four         91       2bbl 3.08   3.15            9.00
## 56       rotor       two         70       4bbl   NA     NA            9.40
## 57       rotor       two         70       4bbl   NA     NA            9.40
## 58       rotor       two         70       4bbl   NA     NA            9.40
## 59       rotor       two         80       mpfi   NA     NA            9.40
## 60         ohc      four        122       2bbl 3.39   3.39            8.60
## 61         ohc      four        122       2bbl 3.39   3.39            8.60
## 62         ohc      four        122       2bbl 3.39   3.39            8.60
## 63         ohc      four        122       2bbl 3.39   3.39            8.60
## 64         ohc      four        122        idi 3.39   3.39           22.70
## 65         ohc      four        122       2bbl 3.39   3.39            8.60
## 66         ohc      four        140       mpfi 3.76   3.16            8.00
## 67         ohc      four        134        idi 3.43   3.64           22.00
## 68         ohc      five        183        idi 3.58   3.64           21.50
## 69         ohc      five        183        idi 3.58   3.64           21.50
## 70         ohc      five        183        idi 3.58   3.64           21.50
## 71         ohc      five        183        idi 3.58   3.64           21.50
## 72        ohcv     eight        234       mpfi 3.46   3.10            8.30
## 73        ohcv     eight        234       mpfi 3.46   3.10            8.30
## 74        ohcv     eight        308       mpfi 3.80   3.35            8.00
## 75        ohcv     eight        304       mpfi 3.80   3.35            8.00
## 76         ohc      four        140       mpfi 3.78   3.12            8.00
## 77         ohc      four         92       2bbl 2.97   3.23            9.40
## 78         ohc      four         92       2bbl 2.97   3.23            9.40
## 79         ohc      four         92       2bbl 2.97   3.23            9.40
## 80         ohc      four         98       spdi 3.03   3.39            7.60
## 81         ohc      four        110       spdi 3.17   3.46            7.50
## 82         ohc      four        122       2bbl 3.35   3.46            8.50
## 83         ohc      four        156       spdi 3.58   3.86            7.00
## 84         ohc      four        156       spdi 3.59   3.86            7.00
## 85         ohc      four        156       spdi 3.59   3.86            7.00
## 86         ohc      four        122       2bbl 3.35   3.46            8.50
## 87         ohc      four        122       2bbl 3.35   3.46            8.50
```

```
## 88         ohc      four        110       spdi 3.17   3.46            7.50
## 89         ohc      four        110       spdi 3.17   3.46            7.50
## 90         ohc      four         97       2bbl 3.15   3.29            9.40
## 91         ohc      four        103        idi 2.99   3.47           21.90
## 92         ohc      four         97       2bbl 3.15   3.29            9.40
## 93         ohc      four         97       2bbl 3.15   3.29            9.40
## 94         ohc      four         97       2bbl 3.15   3.29            9.40
## 95         ohc      four         97       2bbl 3.15   3.29            9.40
## 96         ohc      four         97       2bbl 3.15   3.29            9.40
## 97         ohc      four         97       2bbl 3.15   3.29            9.40
## 98         ohc      four         97       2bbl 3.15   3.29            9.40
## 99         ohc      four         97       2bbl 3.15   3.29            9.40
## 100        ohc      four        120       2bbl 3.33   3.47            8.50
## 101        ohc      four        120       2bbl 3.33   3.47            8.50
## 102       ohcv       six        181       mpfi 3.43   3.27            9.00
## 103       ohcv       six        181       mpfi 3.43   3.27            9.00
## 104       ohcv       six        181       mpfi 3.43   3.27            9.00
## 105       ohcv       six        181       mpfi 3.43   3.27            9.00
## 106       ohcv       six        181       mpfi 3.43   3.27            7.80
## 107       ohcv       six        181       mpfi 3.43   3.27            9.00
## 108          l      four        120       mpfi 3.46   3.19            8.40
## 109          l      four        152        idi 3.70   3.52           21.00
## 110          l      four        120       mpfi 3.46   3.19            8.40
## 111          l      four        152        idi 3.70   3.52           21.00
## 112          l      four        120       mpfi 3.46   2.19            8.40
## 113          l      four        152        idi 3.70   3.52           21.00
## 114          l      four        120       mpfi 3.46   2.19            8.40
## 115          l      four        152        idi 3.70   3.52           21.00
## 116          l      four        120       mpfi 3.46   3.19            8.40
## 117          l      four        152        idi 3.70   3.52           21.00
## 118          l      four        134       mpfi 3.61   3.21            7.00
## 119        ohc      four         90       2bbl 2.97   3.23            9.40
## 120        ohc      four         98       spdi 3.03   3.39            7.60
## 121        ohc      four         90       2bbl 2.97   3.23            9.40
## 122        ohc      four         90       2bbl 2.97   3.23            9.40
## 123        ohc      four         98       2bbl 2.97   3.23            9.40
## 124        ohc      four        122       2bbl 3.35   3.46            8.50
## 125        ohc      four        156       spdi 3.59   3.86            7.00
## 126        ohc      four        151       mpfi 3.94   3.11            9.50
## 127       ohcf       six        194       mpfi 3.74   2.90            9.50
## 128       ohcf       six        194       mpfi 3.74   2.90            9.50
## 129       ohcf       six        194       mpfi 3.74   2.90            9.50
## 130      dohcv     eight        203       mpfi 3.94   3.11           10.00
## 131        ohc      four        132       mpfi 3.46   3.90            8.70
## 132        ohc      four        132       mpfi 3.46   3.90            8.70
## 133        ohc      four        121       mpfi 3.54   3.07            9.31
## 134        ohc      four        121       mpfi 3.54   3.07            9.30
## 135        ohc      four        121       mpfi 2.54   2.07            9.30
## 136        ohc      four        121       mpfi 3.54   3.07            9.30
## 137       dohc      four        121       mpfi 3.54   3.07            9.00
## 138       dohc      four        121       mpfi 3.54   3.07            9.00
## 139       ohcf      four         97       2bbl 3.62   2.36            9.00
## 140       ohcf      four        108       2bbl 3.62   2.64            8.70
## 141       ohcf      four        108       2bbl 3.62   2.64            8.70
```

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## 142       ohcf      four        108       2bbl 3.62   2.64            9.50
## 143       ohcf      four        108       2bbl 3.62   2.64            9.50
## 144       ohcf      four        108       mpfi 3.62   2.64            9.00
## 145       ohcf      four        108       2bbl 3.62   2.64            9.00
## 146       ohcf      four        108       mpfi 3.62   2.64            7.70
## 147       ohcf      four        108       2bbl 3.62   2.64            9.00
## 148       ohcf      four        108       mpfi 3.62   2.64            9.00
## 149       ohcf      four        108       2bbl 3.62   2.64            9.00
## 150       ohcf      four        108       mpfi 3.62   2.64            7.70
## 151        ohc      four         92       2bbl 3.05   3.03            9.00
## 152        ohc      four         92       2bbl 3.05   3.03            9.00
## 153        ohc      four         92       2bbl 3.05   3.03            9.00
## 154        ohc      four         92       2bbl 3.05   3.03            9.00
## 155        ohc      four         92       2bbl 3.05   3.03            9.00
## 156        ohc      four         92       2bbl 3.05   3.03            9.00
## 157        ohc      four         98       2bbl 3.19   3.03            9.00
## 158        ohc      four         98       2bbl 3.19   3.03            9.00
## 159        ohc      four        110        idi 3.27   3.35           22.50
## 160        ohc      four        110        idi 3.27   3.35           22.50
## 161        ohc      four         98       2bbl 3.19   3.03            9.00
## 162        ohc      four         98       2bbl 3.19   3.03            9.00
## 163        ohc      four         98       2bbl 3.19   3.03            9.00
## 164        ohc      four         98       2bbl 3.19   3.03            9.00
## 165        ohc      four         98       2bbl 3.19   3.03            9.00
## 166       dohc      four         98       mpfi 3.24   3.08            9.40
## 167       dohc      four         98       mpfi 3.24   3.08            9.40
## 168        ohc      four        146       mpfi 3.62   3.50            9.30
## 169        ohc      four        146       mpfi 3.62   3.50            9.30
## 170        ohc      four        146       mpfi 3.62   3.50            9.30
## 171        ohc      four        146       mpfi 3.62   3.50            9.30
## 172        ohc      four        146       mpfi 3.62   3.50            9.30
## 173        ohc      four        146       mpfi 3.62   3.50            9.30
## 174        ohc      four        122       mpfi 3.31   3.54            8.70
## 175        ohc      four        110        idi 3.27   3.35           22.50
## 176        ohc      four        122       mpfi 3.31   3.54            8.70
## 177        ohc      four        122       mpfi 3.31   3.54            8.70
## 178        ohc      four        122       mpfi 3.31   3.54            8.70
## 179       dohc       six        171       mpfi 3.27   3.35            9.30
## 180       dohc       six        171       mpfi 3.27   3.35            9.30
## 181       dohc       six        171       mpfi 3.27   3.35            9.20
## 182       dohc       six        161       mpfi 3.27   3.35            9.20
## 183        ohc      four         97        idi 3.01   3.40           23.00
## 184        ohc      four        109       mpfi 3.19   3.40            9.00
## 185        ohc      four         97        idi 3.01   3.40           23.00
## 186        ohc      four        109       mpfi 3.19   3.40            9.00
## 187        ohc      four        109       mpfi 3.19   3.40            9.00
## 188        ohc      four         97        idi 3.01   3.40           23.00
## 189        ohc      four        109       mpfi 3.19   3.40           10.00
## 190        ohc      four        109       mpfi 3.19   3.40            8.50
## 191        ohc      four        109       mpfi 3.19   3.40            8.50
## 192        ohc      five        136       mpfi 3.19   3.40            8.50
## 193        ohc      four         97        idi 3.01   3.40           23.00
## 194        ohc      four        109       mpfi 3.19   3.40            9.00
## 195        ohc      four        141       mpfi 3.78   3.15            9.50
```

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## 196        ohc      four        141       mpfi 3.78   3.15            9.50
## 197        ohc      four        141       mpfi 3.78   3.15            9.50
## 198        ohc      four        141       mpfi 3.78   3.15            9.50
## 199        ohc      four        130       mpfi 3.62   3.15            7.50
## 200        ohc      four        130       mpfi 3.62   3.15            7.50
## 201        ohc      four        141       mpfi 3.78   3.15            9.50
## 202        ohc      four        141       mpfi 3.78   3.15            8.70
## 203       ohcv       six        173       mpfi 3.58   2.87            8.80
## 204        ohc       six        145        idi 3.01   3.40           23.00
## 205        ohc      four        141       mpfi 3.78   3.15            9.50
##     horsePower peakRpm cityMpg highwayMpg price precioNormRango
## 1          111    5000      21         27 13495    0.2079588898
## 2          111    5000      21         27 16500    0.2825579663
## 3          154    5000      19         26 16500    0.2825579663
## 4          102    5500      24         30 13950    0.2192542575
## 5          115    5500      18         22 17450    0.3061417010
## 6          110    5500      19         25 15250    0.2515267365
## 7          110    5500      19         25 17710    0.3125961968
## 8          110    5500      19         25 18920    0.3426344273
## 9          140    5500      17         20 23875    0.4656422223
## 10         160    5500      16         22    NA             NA
## 11         101    5800      23         29 16430    0.2808202175
## 12         101    5800      23         29 16925    0.2931085845
## 13         121    4250      21         28 20970    0.3935256442
## 14         121    4250      21         28 21105    0.3968770170
## 15         121    4250      20         25 24565    0.4827714612
## 16         182    5400      16         22 30760    0.6365622362
## 17         182    5400      16         22 41315    0.8985899409
## 18         182    5400      15         20 36880    0.7884911375
## 19          48    5100      47         53  5151    0.0008192245
## 20          70    5400      38         43  6295    0.0292190060
## 21          70    5400      38         43  6575    0.0361700015
## 22          68    5500      37         41  5572    0.0112705427
## 23          68    5500      31         38  6377    0.0312546547
## 24         102    5500      24         30  7957    0.0704781292
## 25          68    5500      31         38  6229    0.0275805571
## 26          68    5500      31         38  6692    0.0390745246
## 27          68    5500      31         38  7609    0.0618390348
## 28         102    5500      24         30  8558    0.0853979445
## 29          88    5000      24         30  8921    0.0944094136
## 30         145    5000      19         24 12964    0.1947768234
## 31          58    4800      49         54  6479    0.0337868030
## 32          76    6000      31         38  6855    0.0431209970
## 33          60    5500      38         42  5399    0.0069758205
## 34          76    6000      30         34  6529    0.0350280522
## 35          76    6000      30         34  7129    0.0499230426
## 36          76    6000      30         34  7295    0.0540439899
## 37          76    6000      30         34  7295    0.0540439899
## 38          86    5800      27         33  7895    0.0689389802
## 39          86    5800      27         33  9095    0.0987289608
## 40          86    5800      27         33  8845    0.0925227149
## 41          86    5800      27         33 10295    0.1285189415
## 42         101    5800      24         28 12945    0.1943051487
## 43         100    5500      25         31 10345    0.1297601907
```

```
## 44          78    4800       24          29  6785    0.0413832481
## 45          70    5400       38          43    NA              NA
## 46          70    5400       38          43    NA              NA
## 47          90    5000       24          29 11048    0.1472121543
## 48         176    4750       15          19 32250    0.6735514622
## 49         176    4750       15          19 35550    0.7554739089
## 50         262    5000       13          17 36000    0.7666451517
## 51          68    5000       30          31  5195    0.0019115238
## 52          68    5000       31          38  6095    0.0242540092
## 53          68    5000       31          38  6795    0.0416314979
## 54          68    5000       31          38  6695    0.0391489996
## 55          68    5000       31          38  7395    0.0565264883
## 56         101    6000       17          23 10945    0.1446551810
## 57         101    6000       17          23 11845    0.1669976665
## 58         101    6000       17          23 13645    0.2116826374
## 59         135    6000       16          23 15645    0.2613326051
## 60          84    4800       26          32  8845    0.0925227149
## 61          84    4800       26          32  8495    0.0838339705
## 62          84    4800       26          32 10595    0.1359664366
## 63          84    4800       26          32 10245    0.1272776923
## 64          64    4650       36          42 10795    0.1409314334
## 65          84    4800       26          32 11245    0.1521026761
## 66         120    5000       19          27 18280    0.3267464376
## 67          72    4200       31          39 18344    0.3283352366
## 68         123    4350       22          25 25552    0.5072737203
## 69         123    4350       22          25 28248    0.5742018768
## 70         123    4350       22          25 28176    0.5724144779
## 71         123    4350       22          25 31600    0.6574152227
## 72         155    4750       16          18 34184    0.7215629810
## 73         155    4750       16          18 35056    0.7432103669
## 74         184    4500       14          16 40960    0.8897770716
## 75         184    4500       14          16 45400    1.0000000000
## 76         175    5000       19          24 16503    0.2826324413
## 77          68    5500       37          41  5389    0.0067275706
## 78          68    5500       31          38  6189    0.0265875577
## 79          68    5500       31          38  6669    0.0385035500
## 80         102    5500       24          30  7689    0.0638250335
## 81         116    5500       23          30  9959    0.1201777469
## 82          88    5000       25          32  8499    0.0839332704
## 83         145    5000       19          24 12629    0.1864604538
## 84         145    5000       19          24 14869    0.2420684177
## 85         145    5000       19          24 14489    0.2326349238
## 86          88    5000       25          32  6989    0.0464475448
## 87          88    5000       25          32  8189    0.0762375254
## 88         116    5500       23          30  9279    0.1032967579
## 89         116    5500       23          30  9279    0.1032967579
## 90          69    5200       31          37  5499    0.0094583189
## 91          55    4800       45          50  7099    0.0491782930
## 92          69    5200       31          37  6649    0.0380070503
## 93          69    5200       31          37  6849    0.0429720471
## 94          69    5200       31          37  7349    0.0553845390
## 95          69    5200       31          37  7299    0.0541432898
## 96          69    5200       31          37  7799    0.0665557817
## 97          69    5200       31          37  7499    0.0591082866
```

```
## 98          69    5200      31         37  7999    0.0715207785
## 99          69    5200      31         37  8249    0.0777270245
## 100         97    5200      27         34  8949    0.0951045132
## 101         97    5200      27         34  9549    0.1099995035
## 102        152    5200      17         22 13499    0.2080581898
## 103        152    5200      17         22 14399    0.2304006752
## 104        152    5200      19         25 13499    0.2080581898
## 105        160    5200      19         25 17199    0.2999106301
## 106        200    5200      17         23 19699    0.3619730897
## 107        160    5200      19         25 18399    0.3297006107
## 108         97    5000      19         24 11900    0.1683630406
## 109         95    4150      28         33 13200    0.2006355196
## 110         97    5000      19         24 12440    0.1817685319
## 111         95    4150      25         25 13860    0.2170200089
## 112         95    5000      19         24 15580    0.2597189812
## 113         95    4150      28         33 16900    0.2924879599
## 114         95    5000      19         24 16695    0.2873988382
## 115         95    4150      25         25 17075    0.2968323321
## 116         97    5000      19         24 16630    0.2857852142
## 117         95    4150      28         33 17950    0.3185541929
## 118        142    5600      18         24 18150    0.3235191897
## 119         68    5500      37         41  5572    0.0112705427
## 120        102    5500      24         30  7957    0.0704781292
## 121         68    5500      31         38  6229    0.0275805571
## 122         68    5500      31         38  6692    0.0390745246
## 123         68    5500      31         38  7609    0.0618390348
## 124         88    5000      24         30  8921    0.0944094136
## 125        145    5000      19         24 12764    0.1898118266
## 126        143    5500      19         27 22018    0.4195422273
## 127        207    5900      17         25 32528    0.6804528077
## 128        207    5900      17         25 34028    0.7176902835
## 129        207    5900      17         25 37028    0.7921652351
## 130        288    5750      17         28    NA             NA
## 131         NA      NA      23         31  9295    0.1036939576
## 132         NA      NA      23         31  9895    0.1185889479
## 133        110    5250      21         28 11850    0.1671217914
## 134        110    5250      21         28 12170    0.1750657862
## 135        110    5250      21         28 15040    0.2463134899
## 136        110    5250      21         28 15510    0.2579812323
## 137        160    5500      19         26 18150    0.3235191897
## 138        160    5500      19         26 18620    0.3351869321
## 139         69    4900      31         36  5118    0.0000000000
## 140         73    4400      26         31  7053    0.0480363438
## 141         73    4400      26         31  7603    0.0616900849
## 142         82    4800      32         37  7126    0.0498485676
## 143         82    4400      28         33  7775    0.0659599821
## 144         94    5200      26         32  9960    0.1202025719
## 145         82    4800      24         25  9233    0.1021548086
## 146        111    4800      24         29 11259    0.1524502259
## 147         82    4800      28         32  7463    0.0582145872
## 148         94    5200      25         31 10198    0.1261109180
## 149         82    4800      23         29  8013    0.0718683283
## 150        111    4800      23         23 11694    0.1632490939
## 151         62    4800      35         39  5348    0.0057097463
```

```
## 152         62    4800       31         38  6338    0.0302864803
## 153         62    4800       31         38  6488    0.0340102279
## 154         62    4800       31         37  6918    0.0446849710
## 155         62    4800       27         32  7898    0.0690134551
## 156         62    4800       27         32  8778    0.0908594409
## 157         70    4800       30         37  6938    0.0451814706
## 158         70    4800       30         37  7198    0.0516359664
## 159         56    4500       34         36  7898    0.0690134551
## 160         56    4500       38         47  7788    0.0662827069
## 161         70    4800       38         47  7738    0.0650414577
## 162         70    4800       28         34  8358    0.0804329477
## 163         70    4800       28         34  9258    0.1027754332
## 164         70    4800       29         34  8058    0.0729854526
## 165         70    4800       29         34  8238    0.0774539497
## 166        112    6600       26         29  9298    0.1037684326
## 167        112    6600       26         29  9538    0.1097264287
## 168        116    4800       24         30  8449    0.0826920213
## 169        116    4800       24         30  9639    0.1122337520
## 170        116    4800       24         30  9989    0.1209224964
## 171        116    4800       24         30 11199    0.1509607269
## 172        116    4800       24         30 11549    0.1596494712
## 173        116    4800       24         30 17669    0.3115783725
## 174         92    4200       29         34  8948    0.0950796882
## 175         73    4500       30         33 10698    0.1385234100
## 176         92    4200       27         32  9988    0.1208976714
## 177         92    4200       27         32 10898    0.1434884067
## 178         92    4200       27         32 11248    0.1521771511
## 179        161    5200       20         24 16558    0.2839978154
## 180        161    5200       19         24 15998    0.2700958244
## 181        156    5200       20         24 15690    0.2624497294
## 182        156    5200       19         24 15750    0.2639392284
## 183         52    4800       37         46  7775    0.0659599821
## 184         85    5250       27         34  7975    0.0709249789
## 185         52    4800       37         46  7995    0.0714214786
## 186         85    5250       27         34  8195    0.0763864753
## 187         85    5250       27         34  8495    0.0838339705
## 188         68    4500       37         42  9495    0.1086589544
## 189        100    5500       26         32  9995    0.1210714463
## 190         90    5500       24         29 11595    0.1607914205
## 191         90    5500       24         29  9980    0.1206990715
## 192        110    5500       19         24 13295    0.2029938931
## 193         68    4500       33         38 13845    0.2166476342
## 194         88    5500       25         31 12290    0.1780447843
## 195        114    5400       23         28 12940    0.1941810238
## 196        114    5400       23         28 13415    0.2059728911
## 197        114    5400       24         28 15985    0.2697730996
## 198        114    5400       24         28 16515    0.2829303411
## 199        162    5100       17         22 18420    0.3302219354
## 200        162    5100       17         22 18950    0.3433791768
## 201        114    5400       23         28 16845    0.2911225858
## 202        160    5300       19         25 19045    0.3457375503
## 203        134    5500       18         23 21485    0.4063105109
## 204        106    4800       26         27 22470    0.4307631200
## 205        114    5400       19         25 22625    0.4346109925
```

```
##     precioNormZscore
## 1        0.036223511
## 2        0.414350467
## 3        0.414350467
## 4        0.093477343
## 5        0.533891434
## 6        0.257059720
## 7        0.566607910
## 8        0.718865352
## 9        1.342365873
## 10                NA
## 11       0.405542185
## 12       0.467829321
## 13       0.976822177
## 14       0.993809578
## 15       1.429190365
## 16       2.208723306
## 17       3.536886373
## 18       2.978818803
## 19      -1.013723682
## 20      -0.869771191
## 21      -0.834538063
## 22      -0.960748158
## 23      -0.859452918
## 24      -0.660637414
## 25      -0.878076142
## 26      -0.819815649
## 27      -0.704427157
## 28      -0.585012022
## 29      -0.539334790
## 30      -0.030593598
## 31      -0.846617993
## 32      -0.799304936
## 33      -0.982517198
## 34      -0.840326363
## 35      -0.764826804
## 36      -0.743938593
## 37      -0.743938593
## 38      -0.668439035
## 39      -0.517439918
## 40      -0.548898067
## 41      -0.366440801
## 42      -0.032984417
## 43      -0.360149171
## 44      -0.808113218
## 45                NA
## 46                NA
## 47      -0.271688855
## 48       2.396213877
## 49       2.811461448
## 50       2.868086117
## 51      -1.008187048
## 52      -0.894937710
## 53      -0.806854892
```

```
## 54      -0.819438152
## 55      -0.731355333
## 56      -0.284649612
## 57      -0.171400275
## 58       0.055098401
## 59       0.306763596
## 60      -0.548898067
## 61      -0.592939476
## 62      -0.328691021
## 63      -0.372732431
## 64      -0.303524502
## 65      -0.246899833
## 66       0.638332490
## 67       0.646385776
## 68       1.553387139
## 69       1.892631822
## 70       1.883571875
## 71       2.314422688
## 72       2.639574120
## 73       2.749300145
## 74       3.492215800
## 75       4.050912533
## 76       0.414727964
## 77      -0.983775524
## 78      -0.883109446
## 79      -0.822709799
## 80      -0.694360550
## 81      -0.408720553
## 82      -0.592436146
## 83      -0.072747518
## 84       0.209117500
## 85       0.161301113
## 86      -0.782443368
## 87      -0.631444251
## 88      -0.494286720
## 89      -0.494286720
## 90      -0.969933938
## 91      -0.768601782
## 92      -0.825226451
## 93      -0.800059932
## 94      -0.737143633
## 95      -0.743435263
## 96      -0.680518964
## 97      -0.718268743
## 98      -0.655352444
## 99      -0.623894295
## 100     -0.535811477
## 101     -0.460311918
## 102      0.036726842
## 103      0.149976179
## 104      0.036726842
## 105      0.502307452
## 106      0.816888946
## 107      0.653306569
```

```
## 108     -0.164479482
## 109     -0.000897105
## 110     -0.096529879
## 111      0.082152409
## 112      0.298584477
## 113      0.464683506
## 114      0.438887823
## 115      0.486704210
## 116      0.430708704
## 117      0.596807733
## 118      0.621974252
## 119     -0.960748158
## 120     -0.660637414
## 121     -0.878076142
## 122     -0.819815649
## 123     -0.704427157
## 124     -0.539334790
## 125     -0.055760118
## 126      1.108694739
## 127      2.431195339
## 128      2.619944235
## 129      2.997442027
## 130               NA
## 131     -0.492273398
## 132     -0.416773840
## 133     -0.170771112
## 134     -0.130504680
## 135      0.230634874
## 136      0.289776195
## 137      0.621974252
## 138      0.681115573
## 139     -1.017876158
## 140     -0.774390082
## 141     -0.705182153
## 142     -0.765204302
## 143     -0.683538946
## 144     -0.408594721
## 145     -0.500075019
## 146     -0.245138177
## 147     -0.722798717
## 148     -0.378646563
## 149     -0.653590788
## 150     -0.190400997
## 151     -0.988934660
## 152     -0.864360389
## 153     -0.845485499
## 154     -0.791377482
## 155     -0.668061537
## 156     -0.557328851
## 157     -0.788860830
## 158     -0.756144355
## 159     -0.668061537
## 160     -0.681903122
## 161     -0.688194752
```

```
## 162     -0.610178542
## 163     -0.496929204
## 164     -0.647928321
## 165     -0.625278454
## 166     -0.491895900
## 167     -0.461696077
## 168     -0.598727776
## 169     -0.448986985
## 170     -0.404945575
## 171     -0.252688133
## 172     -0.208646723
## 173      0.561448773
## 174     -0.535937309
## 175     -0.315730264
## 176     -0.405071408
## 177     -0.290563744
## 178     -0.246522335
## 179      0.421648757
## 180      0.351182503
## 181      0.312426063
## 182      0.319976018
## 183     -0.683538946
## 184     -0.658372427
## 185     -0.655855775
## 186     -0.630689255
## 187     -0.592939476
## 188     -0.467106879
## 189     -0.404190580
## 190     -0.202858424
## 191     -0.406078069
## 192      0.011056992
## 193      0.080264920
## 194     -0.115404769
## 195     -0.033613580
## 196      0.026156903
## 197      0.349546679
## 198      0.416237956
## 199      0.655949054
## 200      0.722640330
## 201      0.457762713
## 202      0.734594427
## 203      1.041625965
## 204      1.165571073
## 205      1.185075126
```

(b) Discretizar en 4 rangos de igual frecuencia y en 4 rangos de igual ancho. Sugerencia: utilice la función binning().

```r
carIns2<-carIns %>%na.omit()

# Discretize price into 4 equal-frequency ranges
carIns2$price_freq <- cut(carIns2$price, breaks = quantile(carIns2$price, probs = seq(0, 1, by = 0.25),

# Discretize price into 4 equal-width ranges
```

```r
carIns2$price_width <- cut(carIns2$price, breaks = 4, labels = FALSE, include.lowest = TRUE)

# Print the transformed data set
print(carIns2)
```

```
## # A tibble: 159 x 28
##     symb normLoss make      fuelType aspiration nDoors bodyStyle driveWheels
##    <int>    <int> <fct>     <fct>    <fct>      <fct>  <fct>     <fct>
##  1     2      164 audi      gas      std        four   sedan     fwd
##  2     2      164 audi      gas      std        four   sedan     4wd
##  3     1      158 audi      gas      std        four   sedan     fwd
##  4     1      158 audi      gas      turbo      four   sedan     fwd
##  5     2      192 bmw       gas      std        two    sedan     rwd
##  6     0      192 bmw       gas      std        four   sedan     rwd
##  7     0      188 bmw       gas      std        two    sedan     rwd
##  8     0      188 bmw       gas      std        four   sedan     rwd
##  9     2      121 chevrolet gas      std        two    hatchback fwd
## 10     1       98 chevrolet gas      std        two    hatchback fwd
## # i 149 more rows
## # i 20 more variables: engineLocation <fct>, wheelBase <dbl>, length <dbl>,
## #   width <dbl>, height <dbl>, curbWeight <int>, engineType <fct>,
## #   nrCylinds <fct>, engineSize <int>, fuelSystem <fct>, bore <dbl>,
## #   stroke <dbl>, compressionRatio <dbl>, horsePower <int>, peakRpm <int>,
## #   cityMpg <int>, highwayMpg <int>, price <int>, price_freq <int>,
## #   price_width <int>
```

3. Con la semilla 111019, obtenga las siguientes muestras en el conjunto de datos de seguro de automóvil. Sugerencia: utilice la función sample_frac().

(a) Una muestra aleatoria del 60% de los casos, con reemplazo.

```r
# Establece el valor de semilla para reproducibilidad
set.seed(111019)

# Convierte el objeto en dataframe
dfAuto <- as.data.frame(carIns)

# Obtiene una muestra aleatoria del %60 de los casos con reemplazo
dfAuto <- sample_frac(dfAuto, 0.6, replace = TRUE)

# Imprime el nuevo dataframe
print(dfAuto)
```

```
##     symb normLoss          make fuelType aspiration nDoors   bodyStyle
## 1      1      128        nissan   diesel        std    two       sedan
## 2      1      101         honda      gas        std    two   hatchback
## 3      0      161        peugot      gas        std   four       sedan
## 4      2       NA          audi      gas        std    two       sedan
## 5      0      102        subaru      gas        std   four       sedan
## 6      3       NA    volkswagen      gas        std    two convertible
## 7     -2      103         volvo      gas        std   four       sedan
## 8      2      137         honda      gas        std    two   hatchback
## 9      1      148         dodge      gas        std   four       sedan
## 10     0       NA       renault      gas        std   four       wagon
```

```
## 11     3       NA    volkswagen      gas        std    two convertible
## 12     0      108        nissan      gas        std   four       sedan
## 13    -1       95         volvo      gas        std   four       sedan
## 14     1       98     chevrolet      gas        std    two   hatchback
## 15     1       NA       porsche      gas        std    two   hatchback
## 16     0       NA    volkswagen      gas        std   four       sedan
## 17    -1       65        toyota      gas        std   four   hatchback
## 18     3      150          saab      gas        std    two   hatchback
## 19     0       NA         isuzu      gas        std   four       sedan
## 20     1      119      plymouth      gas        std    two   hatchback
## 21     1       NA   alfa-romero      gas        std    two   hatchback
## 22     3       NA   alfa-romero      gas        std    two convertible
## 23     1      128        nissan      gas        std    two       sedan
## 24     1      168        toyota      gas        std    two   hatchback
## 25    -1       93 mercedes-benz   diesel      turbo   four       sedan
## 26     3       NA   alfa-romero      gas        std    two convertible
## 27     2      192           bmw      gas        std    two       sedan
## 28     1       NA       porsche      gas        std    two   hatchback
## 29     2      134        toyota      gas        std    two     hardtop
## 30    -1       74         volvo      gas      turbo   four       wagon
## 31     1      101         honda      gas        std    two   hatchback
## 32     3       NA    volkswagen      gas        std    two convertible
## 33     2       NA         isuzu      gas        std    two   hatchback
## 34     3       NA      plymouth      gas      turbo    two   hatchback
## 35     0      115         mazda      gas        std   four       sedan
## 36     0      192           bmw      gas        std   four       sedan
## 37    -1       95         volvo      gas        std   four       sedan
## 38     1      118         dodge      gas      turbo    two   hatchback
## 39     1      113         mazda      gas        std   four       sedan
## 40     2      134        toyota      gas        std    two   hatchback
## 41     0      108        nissan      gas        std   four       wagon
## 42     2      134        toyota      gas        std    two convertible
## 43     0       NA        peugot      gas        std   four       wagon
## 44     1      125    mitsubishi      gas        std   four       sedan
## 45     1      158          audi      gas      turbo   four       sedan
## 46     0       NA        peugot      gas        std   four       wagon
## 47     0      115         mazda      gas        std   four       sedan
## 48     0       85         honda      gas        std   four       sedan
## 49     1      231        nissan      gas        std    two   hatchback
## 50     1      113         mazda      gas        std   four       sedan
## 51     0      145        jaguar      gas        std   four       sedan
## 52     1      148         dodge      gas      turbo   <NA>       sedan
## 53     2      164          audi      gas        std   four       sedan
## 54     3      150          saab      gas        std    two   hatchback
## 55     3      145         dodge      gas      turbo    two   hatchback
## 56     3      197        toyota      gas        std    two   hatchback
## 57     3      153    mitsubishi      gas        std    two   hatchback
## 58     1      128        nissan      gas        std    two       sedan
## 59     0       91        toyota      gas        std   four       wagon
## 60    -1       74      plymouth      gas        std   four       wagon
## 61     1      168        toyota      gas        std    two       sedan
## 62     3      256    volkswagen      gas        std    two   hatchback
## 63     0      161        peugot      gas      turbo   four       sedan
## 64     0       NA           bmw      gas        std   four       sedan
```

```
## 65     0       78         honda      gas        std   four       wagon
## 66    -1       95         volvo      gas      turbo   four       sedan
## 67     2      134        toyota      gas        std    two     hardtop
## 68     0       NA           bmw      gas        std    two       sedan
## 69     0       NA        peugot      gas        std   four       wagon
## 70     0       91        toyota   diesel        std   four       sedan
## 71     1      148         dodge      gas      turbo   <NA>       sedan
## 72     0      161        peugot      gas        std   four       sedan
## 73    -1       95         volvo      gas      turbo   four       sedan
## 74     1      128        nissan      gas        std    two       sedan
## 75     1      104         mazda      gas        std    two   hatchback
## 76     0       NA        peugot   diesel      turbo   four       wagon
## 77     3      150         mazda      gas        std    two   hatchback
## 78    -1       65        toyota      gas        std   four       sedan
## 79     2      134        toyota      gas        std    two     hardtop
## 80     3      150          saab      gas        std    two   hatchback
## 81     1      168        toyota      gas        std    two       sedan
## 82     0       91        toyota      gas        std   four   hatchback
## 83     2      104          saab      gas        std   four       sedan
## 84     2      164          audi      gas        std   four       sedan
## 85     0       85        subaru      gas      turbo   four       wagon
## 86     0      108        nissan      gas        std   four       sedan
## 87     3      150         mazda      gas        std    two   hatchback
## 88    -1       74         volvo      gas      turbo   four       wagon
## 89     1      122        nissan      gas        std   four       sedan
## 90     2      161    mitsubishi      gas        std    two   hatchback
## 91     3      150         mazda      gas        std    two   hatchback
## 92     0       85        subaru      gas        std   four       wagon
## 93     0      102        subaru      gas      turbo   four       sedan
## 94     1      104         mazda      gas        std    two   hatchback
## 95     0       91        toyota      gas        std   four       wagon
## 96     2       83        subaru      gas        std    two   hatchback
## 97    -1       90        toyota      gas        std   four       sedan
## 98    -1       74         volvo      gas        std   four       wagon
## 99     0       91        toyota      gas        std   four       wagon
## 100    3       NA    mitsubishi      gas      turbo    two   hatchback
## 101    3      150          saab      gas        std    two   hatchback
## 102    0      106        nissan      gas        std   four   hatchback
## 103    2       94    volkswagen   diesel        std   four       sedan
## 104    0      110         honda      gas        std   four       sedan
## 105    3       NA    mitsubishi      gas      turbo    two   hatchback
## 106    3      150         mazda      gas        std    two   hatchback
## 107    0       NA mercedes-benz      gas        std   four       sedan
## 108    0       NA        peugot      gas        std   four       wagon
## 109    1      128        nissan   diesel        std    two       sedan
## 110    0      161        peugot      gas        std   four       sedan
## 111    0       91        toyota      gas        std   four   hatchback
## 112    3      153    mitsubishi      gas        std    two   hatchback
## 113    0      161        peugot      gas        std   four       sedan
## 114    0       91        toyota   diesel        std   four   hatchback
## 115    1       74        toyota      gas        std   four   hatchback
## 116    0      115         mazda      gas        std   four       sedan
## 117    2      122    volkswagen   diesel        std    two       sedan
## 118    0      102        subaru      gas        std   four       sedan
```

```
## 119    2      134        toyota      gas        std    two     hardtop
## 120    0       91        toyota      gas        std   four   hatchback
## 121    0       89        subaru      gas        std   four       wagon
## 122    0       NA        peugot      gas        std   four       wagon
## 123    1      148         dodge      gas        std   four       sedan
##     driveWheels engineLocation wheelBase length width height curbWeight
## 1           fwd          front      94.5  165.3  63.8   54.5       2017
## 2           fwd          front      93.7  150.0  64.0   52.6       1940
## 3           rwd          front     107.9  186.7  68.4   56.7       3075
## 4           fwd          front      99.8  177.3  66.3   53.1       2507
## 5           4wd          front      97.0  172.0  65.4   54.3       2385
## 6           fwd          front      94.5  159.3  64.2   55.6       2254
## 7           rwd          front     104.3  188.8  67.2   56.2       2935
## 8           fwd          front      86.6  144.6  63.9   50.8       1713
## 9           fwd          front      93.7  157.3  63.8   50.6       1989
## 10          fwd          front      96.1  181.5  66.5   55.2       2579
## 11          fwd          front      94.5  159.3  64.2   55.6       2254
## 12          fwd          front     100.4  184.6  66.5   55.1       3060
## 13          rwd          front     109.1  188.8  68.9   55.5       3012
## 14          fwd          front      94.5  155.9  63.6   52.0       1874
## 15          rwd          front      98.4  175.7  72.3   50.5       3366
## 16          fwd          front     100.4  180.2  66.9   55.1       2661
## 17          fwd          front     102.4  175.6  66.5   53.9       2458
## 18          fwd          front      99.1  186.6  66.5   56.1       2658
## 19          rwd          front      94.3  170.7  61.8   53.5       2337
## 20          fwd          front      93.7  157.3  63.8   50.8       1918
## 21          rwd          front      94.5  171.2  65.5   52.4       2823
## 22          rwd          front      88.6  168.8  64.1   48.8       2548
## 23          fwd          front      94.5  165.3  63.8   54.5       1889
## 24          rwd          front      94.5  168.7  64.0   52.6       2204
## 25          rwd          front     110.0  190.9  70.3   56.5       3515
## 26          rwd          front      88.6  168.8  64.1   48.8       2548
## 27          rwd          front     101.2  176.8  64.8   54.3       2395
## 28          rwd          front      98.4  175.7  72.3   50.5       3366
## 29          rwd          front      98.4  176.2  65.6   52.0       2679
## 30          rwd          front     104.3  188.8  67.2   57.5       3157
## 31          fwd          front      93.7  150.0  64.0   52.6       1837
## 32          fwd          front      94.5  159.3  64.2   55.6       2254
## 33          rwd          front      96.0  172.6  65.2   51.4       2734
## 34          rwd          front      95.9  173.2  66.3   50.2       2818
## 35          fwd          front      98.8  177.8  66.5   55.5       2410
## 36          rwd          front     101.2  176.8  64.8   54.3       2395
## 37          rwd          front     109.1  188.8  68.9   55.5       2952
## 38          fwd          front      93.7  157.3  63.8   50.8       2128
## 39          fwd          front      93.1  166.8  64.2   54.1       1945
## 40          rwd          front      98.4  176.2  65.6   52.0       2714
## 41          fwd          front     100.4  184.6  66.5   56.1       3296
## 42          rwd          front      98.4  176.2  65.6   53.0       2975
## 43          rwd          front     114.2  198.9  68.4   56.7       3285
## 44          fwd          front      96.3  172.4  65.4   51.6       2365
## 45          fwd          front     105.8  192.7  71.4   55.9       3086
## 46          rwd          front     114.2  198.9  68.4   58.7       3230
## 47          fwd          front      98.8  177.8  66.5   55.5       2410
## 48          fwd          front      96.5  175.4  65.2   54.1       2304
```

```
## 49          rwd          front        99.2  178.5  67.9   49.7        3139
## 50          fwd          front        93.1  166.8  64.2   54.1        1950
## 51          rwd          front       113.0  199.6  69.6   52.8        4066
## 52          fwd          front        93.7  157.3  63.8   50.6        2191
## 53          4wd          front        99.4  176.6  66.4   54.3        2824
## 54          fwd          front        99.1  186.6  66.5   56.1        2658
## 55          fwd          front        95.9  173.2  66.3   50.2        2811
## 56          rwd          front       102.9  183.5  67.7   52.0        2976
## 57          fwd          front        96.3  173.0  65.4   49.4        2328
## 58          fwd          front        94.5  165.3  63.8   54.5        1951
## 59          4wd          front        95.7  169.7  63.6   59.1        3110
## 60          fwd          front       103.3  174.6  64.6   59.8        2535
## 61          rwd          front        94.5  168.7  64.0   52.6        2265
## 62          fwd          front        94.5  165.7  64.0   51.4        2221
## 63          rwd          front       108.0  186.7  68.3   56.0        3130
## 64          rwd          front       110.0  197.0  70.9   56.3        3505
## 65          fwd          front        96.5  157.1  63.9   58.3        2024
## 66          rwd          front       109.1  188.8  68.8   55.5        3049
## 67          rwd          front        98.4  176.2  65.6   52.0        2540
## 68          rwd          front       103.5  193.8  67.9   53.7        3380
## 69          rwd          front       114.2  198.9  68.4   58.7        3230
## 70          fwd          front        95.7  166.3  64.4   53.0        2275
## 71          fwd          front        93.7  157.3  63.8   50.6        2191
## 72          rwd          front       107.9  186.7  68.4   56.7        3075
## 73          rwd          front       109.1  188.8  68.9   55.5        3062
## 74          fwd          front        94.5  165.3  63.8   54.5        1889
## 75          fwd          front        93.1  159.1  64.2   54.1        1890
## 76          rwd          front       114.2  198.9  68.4   58.7        3430
## 77          rwd          front        95.3  169.0  65.7   49.6        2380
## 78          fwd          front       102.4  175.6  66.5   54.9        2326
## 79          rwd          front        98.4  176.2  65.6   52.0        2536
## 80          fwd          front        99.1  186.6  66.5   56.1        2658
## 81          rwd          front        94.5  168.7  64.0   52.6        2265
## 82          fwd          front        95.7  166.3  64.4   52.8        2122
## 83          fwd          front        99.1  186.6  66.5   56.1        2695
## 84          fwd          front        99.8  176.6  66.2   54.3        2337
## 85          4wd          front        96.9  173.6  65.4   54.9        2650
## 86          fwd          front       100.4  184.6  66.5   55.1        3060
## 87          rwd          front        95.3  169.0  65.7   49.6        2380
## 88          rwd          front       104.3  188.8  67.2   57.5        3157
## 89          fwd          front        94.5  165.3  63.8   54.5        1938
## 90          fwd          front        93.7  157.3  64.4   50.8        2004
## 91          rwd          front        95.3  169.0  65.7   49.6        2500
## 92          4wd          front        96.9  173.6  65.4   54.9        2420
## 93          4wd          front        97.0  172.0  65.4   54.3        2510
## 94          fwd          front        93.1  159.1  64.2   54.1        1905
## 95          4wd          front        95.7  169.7  63.6   59.1        3110
## 96          fwd          front        93.7  156.9  63.4   53.7        2050
## 97          rwd          front       104.5  187.8  66.5   54.1        3131
## 98          rwd          front       104.3  188.8  67.2   57.5        3034
## 99          4wd          front        95.7  169.7  63.6   59.1        3110
## 100         fwd          front        95.9  173.2  66.3   50.2        2926
## 101         fwd          front        99.1  186.6  66.5   56.1        2658
## 102         fwd          front        97.2  173.4  65.2   54.7        2324
```

```
## 103         fwd          front      97.3  171.7  65.5   55.7        2264
## 104         fwd          front      96.5  163.4  64.0   54.5        2010
## 105         fwd          front      95.9  173.2  66.3   50.2        2833
## 106         rwd          front      95.3  169.0  65.7   49.6        2380
## 107         rwd          front     120.9  208.1  71.7   56.7        3900
## 108         rwd          front     114.2  198.9  68.4   56.7        3285
## 109         fwd          front      94.5  165.3  63.8   54.5        2017
## 110         rwd          front     107.9  186.7  68.4   56.7        3020
## 111         fwd          front      95.7  166.3  64.4   52.8        2109
## 112         fwd          front      96.3  173.0  65.4   49.4        2328
## 113         rwd          front     107.9  186.7  68.4   56.7        3075
## 114         fwd          front      95.7  166.3  64.4   52.8        2275
## 115         fwd          front      95.7  158.7  63.6   54.5        2015
## 116         fwd          front      98.8  177.8  66.5   55.5        2410
## 117         fwd          front      97.3  171.7  65.5   55.7        2261
## 118         fwd          front      97.2  172.0  65.4   52.5        2145
## 119         rwd          front      98.4  176.2  65.6   52.0        2536
## 120         fwd          front      95.7  166.3  64.4   52.8        2109
## 121         fwd          front      97.0  173.5  65.4   53.0        2290
## 122         rwd          front     114.2  198.9  68.4   56.7        3285
## 123         fwd          front      93.7  157.3  63.8   50.6        1989
##     engineType nrCylinds engineSize fuelSystem bore stroke compressionRatio
## 1          ohc      four        103        idi 2.99   3.47            21.90
## 2          ohc      four         92       1bbl 2.91   3.41             9.20
## 3            l      four        120       mpfi 3.46   3.19             8.40
## 4          ohc      five        136       mpfi 3.19   3.40             8.50
## 5         ohcf      four        108       2bbl 3.62   2.64             9.00
## 6          ohc      four        109       mpfi 3.19   3.40             8.50
## 7          ohc      four        141       mpfi 3.78   3.15             9.50
## 8          ohc      four         92       1bbl 2.91   3.41             9.60
## 9          ohc      four         90       2bbl 2.97   3.23             9.40
## 10         ohc      four        132       mpfi 3.46   3.90             8.70
## 11         ohc      four        109       mpfi 3.19   3.40             8.50
## 12        ohcv       six        181       mpfi 3.43   3.27             9.00
## 13        ohcv       six        173       mpfi 3.58   2.87             8.80
## 14         ohc      four         90       2bbl 3.03   3.11             9.60
## 15       dohcv     eight        203       mpfi 3.94   3.11            10.00
## 16         ohc      five        136       mpfi 3.19   3.40             8.50
## 17         ohc      four        122       mpfi 3.31   3.54             8.70
## 18         ohc      four        121       mpfi 3.54   3.07             9.31
## 19         ohc      four        111       2bbl 3.31   3.23             8.50
## 20         ohc      four         90       2bbl 2.97   3.23             9.40
## 21        ohcv       six        152       mpfi 2.68   3.47             9.00
## 22        dohc      four        130       mpfi 3.47   2.68             9.00
## 23         ohc      four         97       2bbl 3.15   3.29             9.40
## 24         ohc      four         98       2bbl 3.19   3.03             9.00
## 25         ohc      five        183        idi 3.58   3.64            21.50
## 26        dohc      four        130       mpfi 3.47   2.68             9.00
## 27         ohc      four        108       mpfi 3.50   2.80             8.80
## 28       dohcv     eight        203       mpfi 3.94   3.11            10.00
## 29         ohc      four        146       mpfi 3.62   3.50             9.30
## 30         ohc      four        130       mpfi 3.62   3.15             7.50
## 31         ohc      four         79       1bbl 2.91   3.07            10.10
## 32         ohc      four        109       mpfi 3.19   3.40             8.50
```

```
## 33         ohc      four        119       spfi 3.43   3.23            9.20
## 34         ohc      four        156       spdi 3.59   3.86            7.00
## 35         ohc      four        122       2bbl 3.39   3.39            8.60
## 36         ohc      four        108       mpfi 3.50   2.80            8.80
## 37         ohc      four        141       mpfi 3.78   3.15            9.50
## 38         ohc      four         98       mpfi 3.03   3.39            7.60
## 39         ohc      four         91       2bbl 3.03   3.15            9.00
## 40         ohc      four        146       mpfi 3.62   3.50            9.30
## 41        ohcv       six        181       mpfi 3.43   3.27            9.00
## 42         ohc      four        146       mpfi 3.62   3.50            9.30
## 43           l      four        120       mpfi 3.46   2.19            8.40
## 44         ohc      four        122       2bbl 3.35   3.46            8.50
## 45         ohc      five        131       mpfi 3.13   3.40            8.30
## 46           l      four        120       mpfi 3.46   3.19            8.40
## 47         ohc      four        122       2bbl 3.39   3.39            8.60
## 48         ohc      four        110       1bbl 3.15   3.58            9.00
## 49        ohcv       six        181       mpfi 3.43   3.27            9.00
## 50         ohc      four         91       2bbl 3.08   3.15            9.00
## 51        dohc       six        258       mpfi 3.63   4.17            8.10
## 52         ohc      four         98       mpfi 3.03   3.39            7.60
## 53         ohc      five        136       mpfi 3.19   3.40            8.00
## 54         ohc      four        121       mpfi 3.54   3.07            9.31
## 55         ohc      four        156        mfi 3.60   3.90            7.00
## 56        dohc       six        171       mpfi 3.27   3.35            9.30
## 57         ohc      four        122       2bbl 3.35   3.46            8.50
## 58         ohc      four         97       2bbl 3.15   3.29            9.40
## 59         ohc      four         92       2bbl 3.05   3.03            9.00
## 60         ohc      four        122       2bbl 3.35   3.46            8.50
## 61        dohc      four         98       mpfi 3.24   3.08            9.40
## 62         ohc      four        109       mpfi 3.19   3.40            8.50
## 63           l      four        134       mpfi 3.61   3.21            7.00
## 64         ohc       six        209       mpfi 3.62   3.39            8.00
## 65         ohc      four         92       1bbl 2.92   3.41            9.20
## 66         ohc      four        141       mpfi 3.78   3.15            8.70
## 67         ohc      four        146       mpfi 3.62   3.50            9.30
## 68         ohc       six        209       mpfi 3.62   3.39            8.00
## 69           l      four        120       mpfi 3.46   3.19            8.40
## 70         ohc      four        110        idi 3.27   3.35           22.50
## 71         ohc      four         98       mpfi 3.03   3.39            7.60
## 72           l      four        120       mpfi 3.46   2.19            8.40
## 73         ohc      four        141       mpfi 3.78   3.15            9.50
## 74         ohc      four         97       2bbl 3.15   3.29            9.40
## 75         ohc      four         91       2bbl 3.03   3.15            9.00
## 76           l      four        152        idi 3.70   3.52           21.00
## 77       rotor       two         70       4bbl   NA     NA            9.40
## 78         ohc      four        122       mpfi 3.31   3.54            8.70
## 79         ohc      four        146       mpfi 3.62   3.50            9.30
## 80         ohc      four        121       mpfi 3.54   3.07            9.31
## 81        dohc      four         98       mpfi 3.24   3.08            9.40
## 82         ohc      four         98       2bbl 3.19   3.03            9.00
## 83         ohc      four        121       mpfi 3.54   3.07            9.30
## 84         ohc      four        109       mpfi 3.19   3.40           10.00
## 85        ohcf      four        108       mpfi 3.62   2.64            7.70
## 86        ohcv       six        181       mpfi 3.43   3.27            9.00
```

```
## 87       rotor       two         70       4bbl   NA     NA             9.40
## 88         ohc      four        130       mpfi 3.62   3.15             7.50
## 89         ohc      four         97       2bbl 3.15   3.29             9.40
## 90         ohc      four         92       2bbl 2.97   3.23             9.40
## 91       rotor       two         80       mpfi   NA     NA             9.40
## 92        ohcf      four        108       2bbl 3.62   2.64             9.00
## 93        ohcf      four        108       mpfi 3.62   2.64             7.70
## 94         ohc      four         91       2bbl 3.03   3.15             9.00
## 95         ohc      four         92       2bbl 3.05   3.03             9.00
## 96        ohcf      four         97       2bbl 3.62   2.36             9.00
## 97        dohc       six        171       mpfi 3.27   3.35             9.20
## 98         ohc      four        141       mpfi 3.78   3.15             9.50
## 99         ohc      four         92       2bbl 3.05   3.03             9.00
## 100        ohc      four        156       spdi 3.59   3.86             7.00
## 101        ohc      four        121       mpfi 3.54   3.07             9.31
## 102        ohc      four        120       2bbl 3.33   3.47             8.50
## 103        ohc      four         97        idi 3.01   3.40            23.00
## 104        ohc      four         92       1bbl 2.91   3.41             9.20
## 105        ohc      four        156       spdi 3.58   3.86             7.00
## 106      rotor       two         70       4bbl   NA     NA             9.40
## 107       ohcv     eight        308       mpfi 3.80   3.35             8.00
## 108          l      four        120       mpfi 3.46   2.19             8.40
## 109        ohc      four        103        idi 2.99   3.47            21.90
## 110          l      four        120       mpfi 3.46   3.19             8.40
## 111        ohc      four         98       2bbl 3.19   3.03             9.00
## 112        ohc      four        122       2bbl 3.35   3.46             8.50
## 113          l      four        120       mpfi 3.46   3.19             8.40
## 114        ohc      four        110        idi 3.27   3.35            22.50
## 115        ohc      four         92       2bbl 3.05   3.03             9.00
## 116        ohc      four        122       2bbl 3.39   3.39             8.60
## 117        ohc      four         97        idi 3.01   3.40            23.00
## 118       ohcf      four        108       2bbl 3.62   2.64             9.50
## 119        ohc      four        146       mpfi 3.62   3.50             9.30
## 120        ohc      four         98       2bbl 3.19   3.03             9.00
## 121       ohcf      four        108       2bbl 3.62   2.64             9.00
## 122          l      four        120       mpfi 3.46   2.19             8.40
## 123        ohc      four         90       2bbl 2.97   3.23             9.40
##     horsePower peakRpm cityMpg highwayMpg price
## 1           55    4800      45         50  7099
## 2           76    6000      30         34  6529
## 3           97    5000      19         24 16630
## 4          110    5500      19         25 15250
## 5           82    4800      24         25  9233
## 6           90    5500      24         29 11595
## 7          114    5400      24         28 15985
## 8           58    4800      49         54  6479
## 9           68    5500      31         38  6692
## 10          NA      NA      23         31  9295
## 11          90    5500      24         29 11595
## 12         152    5200      19         25 13499
## 13         134    5500      18         23 21485
## 14          70    5400      38         43  6295
## 15         288    5750      17         28    NA
## 16         110    5500      19         24 13295
```

```
## 17          92    4200       27          32 11248
## 18         110    5250       21          28 11850
## 19          78    4800       24          29  6785
## 20          68    5500       37          41  5572
## 21         154    5000       19          26 16500
## 22         111    5000       21          27 13495
## 23          69    5200       31          37  5499
## 24          70    4800       29          34  8238
## 25         123    4350       22          25 25552
## 26         111    5000       21          27 13495
## 27         101    5800       23          29 16430
## 28         288    5750       17          28    NA
## 29         116    4800       24          30 11199
## 30         162    5100       17          22 18950
## 31          60    5500       38          42  5399
## 32          90    5500       24          29 11595
## 33          90    5000       24          29 11048
## 34         145    5000       19          24 12764
## 35          84    4800       26          32 10245
## 36         101    5800       23          29 16925
## 37         114    5400       23          28 16845
## 38         102    5500       24          30  7957
## 39          68    5000       31          38  6695
## 40         116    4800       24          30 11549
## 41         152    5200       17          22 14399
## 42         116    4800       24          30 17669
## 43          95    5000       19          24 16695
## 44          88    5000       25          32  6989
## 45         140    5500       17          20 23875
## 46          97    5000       19          24 12440
## 47          84    4800       26          32 10245
## 48          86    5800       27          33  8845
## 49         160    5200       19          25 18399
## 50          68    5000       31          38  7395
## 51         176    4750       15          19 32250
## 52         102    5500       24          30  8558
## 53         115    5500       18          22 17450
## 54         110    5250       21          28 11850
## 55         145    5000       19          24 12964
## 56         161    5200       20          24 16558
## 57          88    5000       25          32  8499
## 58          69    5200       31          37  7299
## 59          62    4800       27          32  8778
## 60          88    5000       24          30  8921
## 61         112    6600       26          29  9298
## 62          90    5500       24          29  9980
## 63         142    5600       18          24 18150
## 64         182    5400       15          20 36880
## 65          76    6000       30          34  7295
## 66         160    5300       19          25 19045
## 67         116    4800       24          30  8449
## 68         182    5400       16          22 41315
## 69          97    5000       19          24 12440
## 70          56    4500       34          36  7898
```

```
## 71          102    5500       24          30  8558
## 72           95    5000       19          24 15580
## 73          114    5400       19          25 22625
## 74           69    5200       31          37  5499
## 75           68    5000       30          31  5195
## 76           95    4150       25          25 13860
## 77          101    6000       17          23 11845
## 78           92    4200       29          34  8948
## 79          116    4800       24          30  9639
## 80          110    5250       21          28 11850
## 81          112    6600       26          29  9298
## 82           70    4800       28          34  8358
## 83          110    5250       21          28 12170
## 84          102    5500       24          30 13950
## 85          111    4800       23          23 11694
## 86          152    5200       19          25 13499
## 87          101    6000       17          23 10945
## 88          162    5100       17          22 18950
## 89           69    5200       31          37  6849
## 90           68    5500       31          38  6669
## 91          135    6000       16          23 15645
## 92           82    4800       23          29  8013
## 93          111    4800       24          29 11259
## 94           68    5000       31          38  6795
## 95           62    4800       27          32  8778
## 96           69    4900       31          36  5118
## 97          156    5200       20          24 15690
## 98          114    5400       23          28 13415
## 99           62    4800       27          32  8778
## 100         145    5000       19          24 14489
## 101         110    5250       21          28 11850
## 102          97    5200       27          34  8949
## 103          52    4800       37          46  7995
## 104          76    6000       30          34  7295
## 105         145    5000       19          24 12629
## 106         101    6000       17          23 11845
## 107         184    4500       14          16 40960
## 108          95    5000       19          24 16695
## 109          55    4800       45          50  7099
## 110          97    5000       19          24 11900
## 111          70    4800       30          37  7198
## 112          88    5000       25          32  8499
## 113          97    5000       19          24 16630
## 114          56    4500       38          47  7788
## 115          62    4800       31          38  6488
## 116          84    4800       26          32  8495
## 117          52    4800       37          46  7775
## 118          82    4800       32          37  7126
## 119         116    4800       24          30  9639
## 120          70    4800       30          37  7198
## 121          82    4800       28          32  7463
## 122          95    5000       19          24 16695
## 123          68    5500       31          38  6692
```

(b) Una muestra estratificada del 60% de los casos de automóviles, según el atributo de tipo de combustible (fuelType).

```
# Establece el valor de semilla para reproducibilidad
set.seed(111019)

# Convierte el objeto en un dataframe
dfComb <- as.data.frame(carIns)

# Crea una muestra estratificada del %60 basada en el atributo fuelType

dfComb <- dfComb %>%
  group_by(fuelType) %>%
  group_split() %>%   # Divide en grupos segun los valores unicos de fuelType
  lapply(function(group) sample_frac(group, 0.6, replace = FALSE)) %>%
  bind_rows()

# Imprime el dataframe resultante
print(dfComb)
```

```
## # A tibble: 123 x 26
##     symb normLoss make          fuelType aspiration nDoors bodyStyle driveWheels
##    <int>    <int> <fct>         <fct>    <fct>      <fct>  <fct>     <fct>
##  1     0       NA mazda         diesel   std        four   sedan     rwd
##  2    -1       93 mercedes-benz diesel   turbo      four   sedan     rwd
##  3     2       94 volkswagen    diesel   std        four   sedan     fwd
##  4     0       93 mercedes-benz diesel   turbo      two    hardtop   rwd
##  5    -1       95 volvo         diesel   turbo      four   sedan     rwd
##  6     0       91 toyota        diesel   std        four   hatchback fwd
##  7     0      161 peugot        diesel   turbo      four   sedan     rwd
##  8    -1       93 mercedes-benz diesel   turbo      four   sedan     rwd
##  9     0      161 peugot        diesel   turbo      four   sedan     rwd
## 10     0      161 peugot        diesel   turbo      four   sedan     rwd
## # i 113 more rows
## # i 18 more variables: engineLocation <fct>, wheelBase <dbl>, length <dbl>,
## #   width <dbl>, height <dbl>, curbWeight <int>, engineType <fct>,
## #   nrCylinds <fct>, engineSize <int>, fuelSystem <fct>, bore <dbl>,
## #   stroke <dbl>, compressionRatio <dbl>, horsePower <int>, peakRpm <int>,
## #   cityMpg <int>, highwayMpg <int>, price <int>
```

(c) Utilice la función table() para inspeccionar la distribución de valores en cada una de las dos muestras anteriores.

```
# Establece la semilla para reproducibilidad
set.seed(111019)

# Convierte el objeto en un dataframe
dfTable <- as.data.frame(carIns)

# Muestra aleatoria del %60 de los casos con reemplazo
mAleatoria <- sample_frac(dfTable, 0.6, replace = TRUE)

# # Muestra estratificada del 60% de los casos de automóviles según fuelType
set.seed(111019)
```

```r
mEstratificada <- dfTable %>%
  group_by(fuelType) %>%
  sample_frac(0.6, replace = FALSE) %>%
  ungroup()

# Inspecciona la distribucion de valores en cada muestra
distAleatoria <- table(mAleatoria$fuelType)
disEstratificada <- table(mEstratificada$fuelType)

# Imprime la distribucion de valores en cada muestra
print(distAleatoria)
```

```
##
## diesel    gas
##      8    115
```

```r
print(disEstratificada)
```

```
##
## diesel    gas
##     12    111
```

4. Cargue el paquete corrplot y seleccione los atributos numéricos del conjunto de datos de seguro de automóvil.

```r
library(corrplot)
```

```
## corrplot 0.92 loaded
```

```r
# Convierte el objeto en un dataframe
dfCar <- as.data.frame(carIns)

# Selecciona los atributos numericos
dfCar <- select_if(dfCar, is.numeric)
```

(a) Usando la función cor (), obtenga el coeficiente de correlación de Pearson entre cada par de variables.

```r
# Calcula el coeficiente de Pearson entre cada par de variables
dfCorrelacionMatriz <- cor(dfCar)

# Imprime la matriz de correlacion
print(dfCorrelacionMatriz)
```

```
##                      symb normLoss  wheelBase     length      width
## symb           1.00000000       NA -0.5319537 -0.3576115 -0.2329191
## normLoss             NA        1         NA         NA         NA
## wheelBase     -0.53195368       NA  1.0000000  0.8745875  0.7951436
## length        -0.35761152       NA  0.8745875  1.0000000  0.8411183
## width         -0.23291906       NA  0.7951436  0.8411183  1.0000000
## height        -0.54103820       NA  0.5894348  0.4910295  0.2792103
## curbWeight    -0.22769059       NA  0.7763863  0.8777285  0.8670325
## engineSize    -0.10578971       NA  0.5693287  0.6833599  0.7354334
## bore                 NA       NA         NA         NA         NA
## stroke               NA       NA         NA         NA         NA
```

```
## compressionRatio -0.17851508       NA  0.2497858  0.1584137  0.1811286
## horsePower                NA       NA         NA         NA         NA
## peakRpm                   NA       NA         NA         NA         NA
## cityMpg          -0.03582263       NA -0.4704136 -0.6709087 -0.6427043
## highwayMpg        0.03460600       NA -0.5440819 -0.7046616 -0.6772179
## price                     NA       NA         NA         NA         NA
##                       height curbWeight  engineSize bore stroke
## symb             -0.54103820 -0.2276906 -0.10578971   NA     NA
## normLoss                  NA         NA          NA   NA     NA
## wheelBase          0.58943476  0.7763863  0.56932868   NA     NA
## length             0.49102946  0.8777285  0.68335987   NA     NA
## width              0.27921032  0.8670325  0.73543340   NA     NA
## height             1.00000000  0.2955717  0.06714874   NA     NA
## curbWeight         0.29557173  1.0000000  0.85059407   NA     NA
## engineSize         0.06714874  0.8505941  1.00000000   NA     NA
## bore                      NA         NA          NA    1     NA
## stroke                    NA         NA          NA   NA      1
## compressionRatio   0.26121423  0.1513617  0.02897136   NA     NA
## horsePower                NA         NA          NA   NA     NA
## peakRpm                   NA         NA          NA   NA     NA
## cityMpg          -0.04863963 -0.7574138 -0.65365792   NA     NA
## highwayMpg       -0.10735763 -0.7974648 -0.67746991   NA     NA
## price                     NA         NA          NA   NA     NA
##                  compressionRatio horsePower peakRpm     cityMpg highwayMpg
## symb                     -0.17851508         NA      NA -0.03582263  0.0346060
## normLoss                        NA         NA      NA          NA         NA
## wheelBase                0.24978585         NA      NA -0.47041361 -0.5440819
## length                   0.15841371         NA      NA -0.67090866 -0.7046616
## width                    0.18112863         NA      NA -0.64270434 -0.6772179
## height                   0.26121423         NA      NA -0.04863963 -0.1073576
## curbWeight               0.15136174         NA      NA -0.75741378 -0.7974648
## engineSize               0.02897136         NA      NA -0.65365792 -0.6774699
## bore                            NA         NA      NA          NA         NA
## stroke                          NA         NA      NA          NA         NA
## compressionRatio         1.00000000         NA      NA  0.32470142  0.2652014
## horsePower                      NA          1      NA          NA         NA
## peakRpm                         NA         NA       1          NA         NA
## cityMpg                  0.32470142         NA      NA  1.00000000  0.9713370
## highwayMpg               0.26520139         NA      NA  0.97133704  1.0000000
## price                           NA         NA      NA          NA         NA
##                  price
## symb                NA
## normLoss            NA
## wheelBase           NA
## length              NA
## width               NA
## height              NA
## curbWeight          NA
## engineSize          NA
## bore                NA
## stroke              NA
## compressionRatio    NA
## horsePower          NA
## peakRpm             NA
```

```
## cityMpg              NA
## highwayMpg           NA
## price                 1
```

###(b) Aplicar la función cor.test() al resultado anterior para calcular los valores p y los intervalos de confianza del coeficiente de correlación para cada par de variables.

```r
# Aplicar cor.test() a cada par de variables en la matriz de correlación
cor_test_results <- apply(dfCorrelacionMatriz, 2, function(x) {
  apply(dfCorrelacionMatriz, 2, function(y) {
    # Verifica si hay al menos 3 observaciones válidas en los pares de variables antes de realizar la p
    if (sum(!is.na(x) & !is.na(y)) >= 3) {
      cor.test(x, y)
    } else {
      list(p.value = NA, conf.int = NA)
    }
  })
})

# Imprimir los resultados
# Recorre la matriz
for (i in 1:ncol(dfCorrelacionMatriz)) {
  for (j in 1:ncol(dfCorrelacionMatriz)) {
    result <- cor_test_results[[i]][[j]]
    p_value <- result$p.value
    conf_interval <- result$conf.int

    # Imprime
    print(paste("Variables:", names(dfCorrelacionMatriz)[i], "-", names(dfCorrelacionMatriz)[j]))
    if (!is.na(p_value)) {
      print(paste("p-value:", p_value))
      print("Confidence Interval:")
      print(conf_interval)
    } else {
      print("No hay suficientes observaciones para calcular la correlación.")
    }
    print("-----------")
  }
}
```

```
## [1] "Variables:  - "
## [1] "p-value: 0"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.0164295167731428"
## [1] "Confidence Interval:"
## [1] -0.9316194 -0.1867033
## attr(,"conf.level")
```

```
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.069179645959289"
## [1] "Confidence Interval:"
## [1] -0.89110428  0.05427735
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.133244647924951"
## [1] "Confidence Interval:"
## [1] -0.8621703  0.1779393
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.000446577902110616"
## [1] "Confidence Interval:"
## [1] -0.9754342 -0.6119296
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.160155972738644"
## [1] "Confidence Interval:"
## [1] -0.8521587  0.2142386
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.300831221263437"
## [1] "Confidence Interval:"
## [1] -0.8084455  0.3443932
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.244420998296568"
## [1] "Confidence Interval:"
## [1] -0.8247689  0.3004754
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
```

```
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.460637061265941"
## [1] "Confidence Interval:"
## [1] -0.4382918  0.7663731
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.372860578843676"
## [1] "Confidence Interval:"
## [1] -0.3910069  0.7889352
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
```

```
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.0164295167731428"
## [1] "Confidence Interval:"
## [1] -0.9316194 -0.1867033
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.39780078525117e-07"
## [1] "Confidence Interval:"
## [1] 0.9162475 0.9954949
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.46840537771126e-05"
## [1] "Confidence Interval:"
## [1] 0.799210 0.988537
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.0116601434365249"
## [1] "Confidence Interval:"
## [1] 0.2380333 0.9383765
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 5.40198640560794e-05"
## [1] "Confidence Interval:"
```

```
## [1] 0.7590846 0.9859508
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.00118125868968013"
## [1] "Confidence Interval:"
## [1] 0.5210756 0.9679931
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.921992921869083"
## [1] "Confidence Interval:"
## [1] -0.6075796  0.6507035
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.00237358374479886"
## [1] "Confidence Interval:"
## [1] -0.9611429 -0.4455247
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.00109511736824098"
## [1] "Confidence Interval:"
## [1] -0.9686525 -0.5287374
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.069179645959289"
## [1] "Confidence Interval:"
## [1] -0.89110428  0.05427735
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
```

```
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.39780078525117e-07"
## [1] "Confidence Interval:"
## [1] 0.9162475 0.9954949
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.64689742203201e-64"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.05223051171341e-07"
## [1] "Confidence Interval:"
## [1] 0.9365528 0.9966210
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.042783542054936"
## [1] "Confidence Interval:"
## [1] 0.03088854 0.90738027
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.7668371528845e-07"
## [1] "Confidence Interval:"
## [1] 0.9317388 0.9963561
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 7.73784273154189e-05"
## [1] "Confidence Interval:"
## [1] 0.7383068 0.9845675
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.818576768241576"
## [1] "Confidence Interval:"
```

```
## [1] -0.6775161  0.5764204
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.000123181347360786"
## [1] "Confidence Interval:"
## [1] -0.9825629 -0.7090050
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 3.74109507767761e-05"
## [1] "Confidence Interval:"
## [1] -0.9872321 -0.7787506
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.133244647924951"
## [1] "Confidence Interval:"
## [1] -0.8621703  0.1779393
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.46840537771126e-05"
## [1] "Confidence Interval:"
## [1] 0.799210 0.988537
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.05223051171341e-07"
## [1] "Confidence Interval:"
## [1] 0.9365528 0.9966210
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0"
## [1] "Confidence Interval:"
```

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## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.110591673679066"
## [1] "Confidence Interval:"
## [1] -0.1418930  0.8713685
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 9.10800049889507e-09"
## [1] "Confidence Interval:"
## [1] 0.9705576 0.9984576
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.80134076677211e-06"
## [1] "Confidence Interval:"
## [1] 0.8519359 0.9917744
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.757372473404885"
## [1] "Confidence Interval:"
## [1] -0.6929427  0.5566728
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.97280903966168e-05"
## [1] "Confidence Interval:"
## [1] -0.9879715 -0.7902889
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 7.81403263648889e-06"
## [1] "Confidence Interval:"
```

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## [1] -0.9914764 -0.8469611
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.000446577902110616"
## [1] "Confidence Interval:"
## [1] -0.9754342 -0.6119296
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.0116601434365249"
## [1] "Confidence Interval:"
## [1] 0.2380333 0.9383765
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.042783542054936"
## [1] "Confidence Interval:"
## [1] 0.03088854 0.90738027
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.110591673679066"
## [1] "Confidence Interval:"
## [1] -0.1418930  0.8713685
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.122807175015777"
## [1] "Confidence Interval:"
## [1] -0.1620715  0.8663057
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.290821815158789"
```

```
## [1] "Confidence Interval:"
## [1] -0.3371611  0.8112613
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.40960229798012"
## [1] "Confidence Interval:"
## [1] -0.4118462  0.7793689
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.302355771638233"
## [1] "Confidence Interval:"
## [1] -0.8080192  0.3454761
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.240859946361403"
## [1] "Confidence Interval:"
## [1] -0.8258415  0.2974122
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.160155972738644"
## [1] "Confidence Interval:"
## [1] -0.8521587  0.2142386
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 5.40198640560794e-05"
## [1] "Confidence Interval:"
```

```
## [1] 0.7590846 0.9859508
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.7668371528845e-07"
## [1] "Confidence Interval:"
## [1] 0.9317388 0.9963561
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 9.10800049889507e-09"
## [1] "Confidence Interval:"
## [1] 0.9705576 0.9984576
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.122807175015777"
## [1] "Confidence Interval:"
## [1] -0.1620715  0.8663057
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.64689742203201e-64"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 8.44132054284532e-07"
## [1] "Confidence Interval:"
## [1] 0.9104088 0.9951669
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.699363446087758"
## [1] "Confidence Interval:"
## [1] -0.7073599  0.5368456
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
```

```
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 7.52257326448373e-06"
## [1] "Confidence Interval:"
## [1] -0.9915591 -0.8483391
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 1.29154740563633e-06"
## [1] "Confidence Interval:"
## [1] -0.9946159 -0.9006751
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.300831221263437"
## [1] "Confidence Interval:"
## [1] -0.8084455  0.3443932
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.00118125868968013"
## [1] "Confidence Interval:"
## [1] 0.5210756 0.9679931
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 7.73784273154189e-05"
## [1] "Confidence Interval:"
## [1] 0.7383068 0.9845675
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.80134076677211e-06"
## [1] "Confidence Interval:"
## [1] 0.8519359 0.9917744
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.290821815158789"
```

```
## [1] "Confidence Interval:"
## [1] -0.3371611  0.8112613
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 8.44132054284532e-07"
## [1] "Confidence Interval:"
## [1] 0.9104088 0.9951669
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.64689742203201e-64"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.506971761655448"
## [1] "Confidence Interval:"
## [1] -0.7547803  0.4602444
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 4.46857261601948e-06"
## [1] "Confidence Interval:"
## [1] -0.9926129 -0.8660701
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.07611655851527e-06"
## [1] "Confidence Interval:"
## [1] -0.9939250 -0.8886029
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
```

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## [1] "-----------"
## [1] "Variables:  - "
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## [1] "Variables:  - "
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## [1] "-----------"
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```

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## [1] "-----------"
## [1] "Variables:  - "
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## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.244420998296568"
## [1] "Confidence Interval:"
## [1] -0.8247689  0.3004754
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
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## [1] "p-value: 0.921992921869083"
## [1] "Confidence Interval:"
## [1] -0.6075796  0.6507035
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.818576768241576"
## [1] "Confidence Interval:"
## [1] -0.6775161  0.5764204
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.757372473404885"
## [1] "Confidence Interval:"
## [1] -0.6929427  0.5566728
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.40960229798012"
## [1] "Confidence Interval:"
## [1] -0.4118462  0.7793689
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.699363446087758"
## [1] "Confidence Interval:"
## [1] -0.7073599  0.5368456
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.506971761655448"
## [1] "Confidence Interval:"
## [1] -0.7547803  0.4602444
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
```

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## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.298702745074292"
## [1] "Confidence Interval:"
## [1] -0.3428731  0.8090417
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.361725862390858"
## [1] "Confidence Interval:"
## [1] -0.3843425  0.7918784
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
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## [1] "-----------"
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## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
```

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## [1] "No hay suficientes observaciones para calcular la correlación."
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## [1] "No hay suficientes observaciones para calcular la correlación."
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## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
```

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## [1] "No hay suficientes observaciones para calcular la correlación."
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## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.460637061265941"
## [1] "Confidence Interval:"
## [1] -0.4382918  0.7663731
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.00237358374479886"
## [1] "Confidence Interval:"
## [1] -0.9611429 -0.4455247
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.000123181347360786"
## [1] "Confidence Interval:"
## [1] -0.9825629 -0.7090050
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.97280903966168e-05"
## [1] "Confidence Interval:"
## [1] -0.9879715 -0.7902889
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.302355771638233"
## [1] "Confidence Interval:"
## [1] -0.8080192  0.3454761
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 7.52257326448373e-06"
## [1] "Confidence Interval:"
## [1] -0.9915591 -0.8483391
## attr(,"conf.level")
```

```
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 4.46857261601948e-06"
## [1] "Confidence Interval:"
## [1] -0.9926129 -0.8660701
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.298702745074292"
## [1] "Confidence Interval:"
## [1] -0.3428731  0.8090417
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.64689742203201e-64"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 4.96067744775155e-11"
## [1] "Confidence Interval:"
## [1] 0.9919467 0.9995824
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.372860578843676"
## [1] "Confidence Interval:"
## [1] -0.3910069  0.7889352
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
```

```
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.00109511736824098"
## [1] "Confidence Interval:"
## [1] -0.9686525 -0.5287374
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 3.74109507767761e-05"
## [1] "Confidence Interval:"
## [1] -0.9872321 -0.7787506
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 7.81403263648889e-06"
## [1] "Confidence Interval:"
## [1] -0.9914764 -0.8469611
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.240859946361403"
## [1] "Confidence Interval:"
## [1] -0.8258415  0.2974122
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 1.29154740563633e-06"
## [1] "Confidence Interval:"
## [1] -0.9946159 -0.9006751
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 2.07611655851527e-06"
## [1] "Confidence Interval:"
## [1] -0.9939250 -0.8886029
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 0.361725862390858"
## [1] "Confidence Interval:"
## [1] -0.3843425  0.7918784
## attr(,"conf.level")
```

```
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 4.96067744775155e-11"
## [1] "Confidence Interval:"
## [1] 0.9919467 0.9995824
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "p-value: 6.64689742203201e-64"
## [1] "Confidence Interval:"
## [1] 1 1
## attr(,"conf.level")
## [1] 0.95
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
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## [1] "No hay suficientes observaciones para calcular la correlación."
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## [1] "No hay suficientes observaciones para calcular la correlación."
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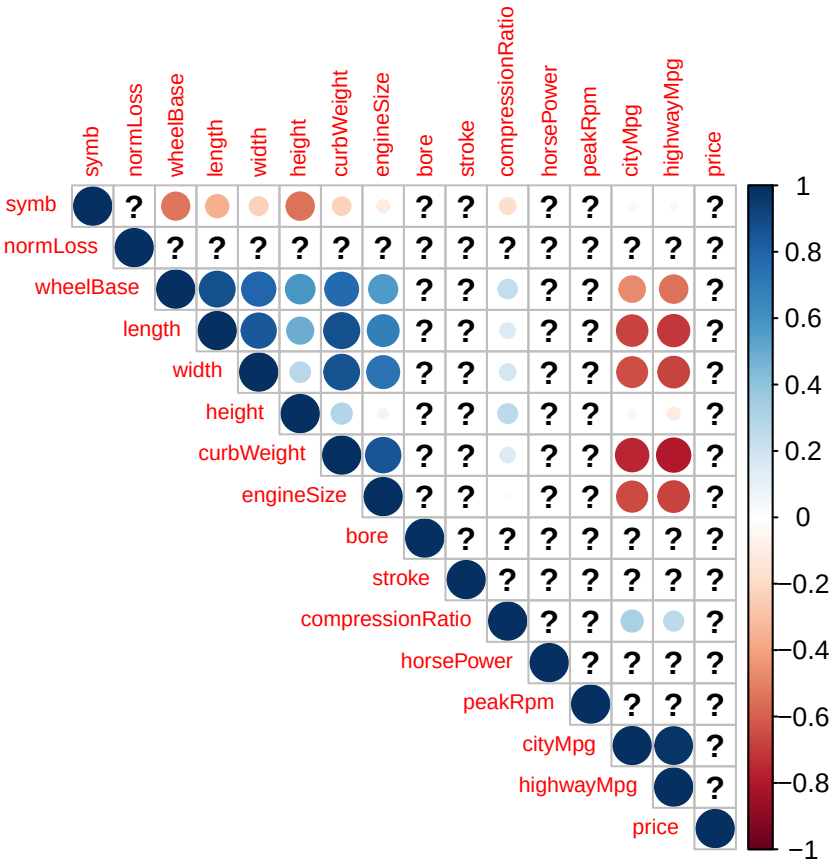
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
```

```
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
## [1] "Variables:  - "
## [1] "No hay suficientes observaciones para calcular la correlación."
## [1] "-----------"
```

(c) Trazar toda la información de correlación usando la función corrplot. Explora algunos de sus parámetros

```r
library(corrplot)

# Trazar la matriz de correlacion
corrplot(dfCorrelacionMatriz, method = "circle", type = "upper", tl.cex = 0.7)
```




```
# method = "circle" indica que se desea representar los coeficientes de correlación utilizando un gráfi
# type = "upper" muestra solo la mitad superior de la matriz de correlación, ya que la mitad inferior e
# tl.cex = 0.7: Controla el tamaño de las etiquetas que se muestran en la matriz de correlación
```

5. Cargue el conjunto de datos USJudgeRatings, del paquete de conjuntos de datos, que contiene las calificaciones de los abogados de los jueces estatales en el Tribunal Superior de EE.UU. con respecto a un conjunto de atributos.

```
# Cargar el archivo csv USJudgeRatings
ruta <- file.path("R:/Politecnica.Nacional/2023-A/Data Mining/Deberes.Data/USJudgeRatings.csv")
dfJudge <- read.csv(ruta)

print(dfJudge)
```

```
##                 X CONT INTG DMNR DILG CFMG DECI PREP FAMI ORAL WRIT PHYS RTEN
## 1    AARONSON,L.H.  5.7  7.9  7.7  7.3  7.1  7.4  7.1  7.1  7.1  7.0  8.3  7.8
## 2   ALEXANDER,J.M.  6.8  8.9  8.8  8.5  7.8  8.1  8.0  8.0  7.8  7.9  8.5  8.7
## 3   ARMENTANO,A.J.  7.2  8.1  7.8  7.8  7.5  7.6  7.5  7.5  7.3  7.4  7.9  7.8
## 4      BERDON,R.I.  6.8  8.8  8.5  8.8  8.3  8.5  8.7  8.7  8.4  8.5  8.8  8.7
## 5     BRACKEN,J.J.  7.3  6.4  4.3  6.5  6.0  6.2  5.7  5.7  5.1  5.3  5.5  4.8
## 6       BURNS,E.B.  6.2  8.8  8.7  8.5  7.9  8.0  8.1  8.0  8.0  8.0  8.6  8.6
## 7    CALLAHAN,R.J. 10.6  9.0  8.9  8.7  8.5  8.5  8.5  8.5  8.6  8.4  9.1  9.0
## 8       COHEN,S.S.  7.0  5.9  4.9  5.1  5.4  5.9  4.8  5.1  4.7  4.9  6.8  5.0
## 9        DALY,J.J.  7.3  8.9  8.9  8.7  8.6  8.5  8.4  8.4  8.4  8.5  8.8  8.8
## 10    DANNEHY,J.F.  8.2  7.9  6.7  8.1  7.9  8.0  7.9  8.1  7.7  7.8  8.5  7.9
## 11       DEAN,H.H.  7.0  8.0  7.6  7.4  7.3  7.5  7.1  7.2  7.1  7.2  8.4  7.7
```

```
## 12     DEVITA,H.J.  6.5  8.0  7.6  7.2  7.0  7.1  6.9  7.0  7.0  7.1  6.9  7.2
## 13   DRISCOLL,P.J.  6.7  8.6  8.2  6.8  6.9  6.6  7.1  7.3  7.2  7.2  8.1  7.7
## 14     GRILLO,A.E.  7.0  7.5  6.4  6.8  6.5  7.0  6.6  6.8  6.3  6.6  6.2  6.5
## 15  HADDEN,W.L.JR.  6.5  8.1  8.0  8.0  7.9  8.0  7.9  7.8  7.8  7.8  8.4  8.0
## 16     HAMILL,E.C.  7.3  8.0  7.4  7.7  7.3  7.3  7.3  7.2  7.1  7.2  8.0  7.6
## 17     HEALEY.A.H.  8.0  7.6  6.6  7.2  6.5  6.5  6.8  6.7  6.4  6.5  6.9  6.7
## 18       HULL,T.C.  7.7  7.7  6.7  7.5  7.4  7.5  7.1  7.3  7.1  7.3  8.1  7.4
## 19       LEVINE,I.  8.3  8.2  7.4  7.8  7.7  7.7  7.7  7.8  7.5  7.6  8.0  8.0
## 20   LEVISTER,R.L.  9.6  6.9  5.7  6.6  6.9  6.6  6.2  6.0  5.8  5.8  7.2  6.0
## 21     MARTIN,L.F.  7.1  8.2  7.7  7.1  6.6  6.6  6.7  6.7  6.8  6.8  7.5  7.3
## 22    MCGRATH,J.F.  7.6  7.3  6.9  6.8  6.7  6.8  6.4  6.3  6.3  6.3  7.4  6.6
## 23    MIGNONE,A.F.  6.6  7.4  6.2  6.2  5.4  5.7  5.8  5.9  5.2  5.8  4.7  5.2
## 24     MISSAL,H.M.  6.2  8.3  8.1  7.7  7.4  7.3  7.3  7.3  7.2  7.3  7.8  7.6
## 25     MULVEY,H.M.  7.5  8.7  8.5  8.6  8.5  8.4  8.5  8.5  8.4  8.4  8.7  8.7
## 26      NARUK,H.J.  7.8  8.9  8.7  8.9  8.7  8.8  8.9  9.0  8.8  8.9  9.0  9.0
## 27    O'BRIEN,F.J.  7.1  8.5  8.3  8.0  7.9  7.9  7.8  7.8  7.8  7.7  8.3  8.2
## 28 O'SULLIVAN,T.J.  7.5  9.0  8.9  8.7  8.4  8.5  8.4  8.3  8.3  8.3  8.8  8.7
## 29       PASKEY,L.  7.5  8.1  7.7  8.2  8.0  8.1  8.2  8.4  8.0  8.1  8.4  8.1
## 30    RUBINOW,J.E.  7.1  9.2  9.0  9.0  8.4  8.6  9.1  9.1  8.9  9.0  8.9  9.2
## 31      SADEN.G.A.  6.6  7.4  6.9  8.4  8.0  7.9  8.2  8.4  7.7  7.9  8.4  7.5
## 32 SATANIELLO,A.G.  8.4  8.0  7.9  7.9  7.8  7.8  7.6  7.4  7.4  7.4  8.1  7.9
## 33       SHEA,D.M.  6.9  8.5  7.8  8.5  8.1  8.2  8.4  8.5  8.1  8.3  8.7  8.3
## 34    SHEA,J.F.JR.  7.3  8.9  8.8  8.7  8.4  8.5  8.5  8.5  8.4  8.4  8.8  8.8
## 35      SIDOR,W.J.  7.7  6.2  5.1  5.6  5.6  5.9  5.6  5.6  5.3  5.5  6.3  5.3
## 36   SPEZIALE,J.A.  8.5  8.3  8.1  8.3  8.4  8.2  8.2  8.1  7.9  8.0  8.0  8.2
## 37     SPONZO,M.J.  6.9  8.3  8.0  8.1  7.9  7.9  7.9  7.7  7.6  7.7  8.1  8.0
## 38  STAPLETON,J.F.  6.5  8.2  7.7  7.8  7.6  7.7  7.7  7.7  7.5  7.6  8.5  7.7
## 39      TESTO,R.J.  8.3  7.3  7.0  6.8  7.0  7.1  6.7  6.7  6.7  6.7  8.0  7.0
## 40 TIERNEY,W.L.JR.  8.3  8.2  7.8  8.3  8.4  8.3  7.7  7.6  7.5  7.7  8.1  7.9
## 41       WALL,R.A.  9.0  7.0  5.9  7.0  7.0  7.2  6.9  6.9  6.5  6.6  7.6  6.6
## 42     WRIGHT,D.B.  7.1  8.4  8.4  7.7  7.5  7.7  7.8  8.2  8.0  8.1  8.3  8.1
## 43   ZARRILLI,K.J.  8.6  7.4  7.0  7.5  7.5  7.7  7.4  7.2  6.9  7.0  7.8  7.1
#
```

(a) Aplique la función prcomp() para obtener los componentes principales. Inspeccione cómo se obtiene cada variable mediante la combinación lineal de cada componente.

```r
# Excluir la 1ra columna del conjunto de datos
dfNumeros <- dfJudge[, -1]

# Aplicar la funcion prcomp()
dfComponentes <- prcomp(dfNumeros)

# Obtiene los componentes principales
componentes <- dfComponentes$x

# Inspecciona la combinacion lineal de cada variable en cada componente
for (i in 1:length(dfComponentes$rotation)) {
  # Obtiene el numero de columnas de dfComponentes$rotationy se asegura de que i sea menor o igual a es
  if (i <= ncol(dfComponentes$rotation)) {
    variable <- names(dfNumeros)[i]
    combLineal <- dfComponentes$rotation[, i]
```

```
    print(paste("Variable:", variable))
    print("Combinación lineal en cada componente:")
    print(combLineal)
    print("-----------------")
  }
}
```

```
## [1] "Variable: CONT"
## [1] "Combinación lineal en cada componente:"
##        CONT        INTG        DMNR        DILG        CFMG        DECI
##  0.00599117 -0.23476045 -0.34774394 -0.28678321 -0.27201855 -0.25330240
##        PREP        FAMI        ORAL        WRIT        PHYS        RTEN
## -0.30910791 -0.30510111 -0.33195277 -0.31396635 -0.27750639 -0.35932337
## [1] "-----------------"
## [1] "Variable: INTG"
## [1] "Combinación lineal en cada componente:"
##         CONT         INTG         DMNR         DILG         CFMG         DECI
##  0.933248839 -0.138724061 -0.232070496  0.047953743  0.163199298  0.117624159
##         PREP         FAMI         ORAL         WRIT         PHYS         RTEN
##  0.047023458  0.014033493  0.009669279 -0.018092578  0.096014861 -0.033595756
## [1] "-----------------"
## [1] "Variable: DMNR"
## [1] "Combinación lineal en cada componente:"
##        CONT        INTG        DMNR        DILG        CFMG        DECI
## -0.31985402 -0.36981582 -0.66343490  0.22433991  0.18935451  0.24920335
##        PREP        FAMI        ORAL        WRIT        PHYS        RTEN
##  0.21702209  0.26692334  0.03718715  0.11487882  0.03603598 -0.19563408
## [1] "-----------------"
## [1] "Variable: DILG"
## [1] "Combinación lineal en cada componente:"
##         CONT         INTG         DMNR         DILG         CFMG         DECI
##  0.112932711  0.252211159  0.034666432  0.272806418 -0.024818035 -0.024620949
##         PREP         FAMI         ORAL         WRIT         PHYS         RTEN
##  0.191109898  0.168833090  0.007519155  0.141585317 -0.859239241 -0.152859043
## [1] "-----------------"
## [1] "Variable: CFMG"
## [1] "Combinación lineal en cada componente:"
##        CONT        INTG        DMNR        DILG        CFMG        DECI
##  0.09462326  0.04590748 -0.19413671 -0.37555702 -0.47964024 -0.42029465
##        PREP        FAMI        ORAL        WRIT        PHYS        RTEN
##  0.14553660  0.47073965  0.25286574  0.29475017  0.09522754  0.02899495
## [1] "-----------------"
## [1] "Variable: DECI"
## [1] "Combinación lineal en cada componente:"
##         CONT         INTG         DMNR         DILG         CFMG         DECI
## -0.002863094 -0.463156453  0.360824575 -0.563858944  0.169861226  0.368776968
##         PREP         FAMI         ORAL         WRIT         PHYS         RTEN
## -0.063861767  0.107554568  0.141530777  0.227041086 -0.241473592 -0.164203864
## [1] "-----------------"
## [1] "Variable: PREP"
## [1] "Combinación lineal en cada componente:"
##         CONT         INTG         DMNR         DILG         CFMG         DECI
##  0.017715828 -0.365508583  0.394379189  0.255305398  0.108985626 -0.482835530
##         PREP         FAMI         ORAL         WRIT         PHYS         RTEN
```

```
##  0.383738578  0.024308258 -0.007364589 -0.102306863  0.158736876 -0.465619269
## [1] "-----------------"
## [1] "Variable: FAMI"
## [1] "Combinación lineal en cada componente:"
##         CONT         INTG         DMNR         DILG         CFMG         DECI
##  0.049191638 -0.417669580  0.167204881  0.282668734 -0.680468974  0.317726213
##         PREP         FAMI         ORAL         WRIT         PHYS         RTEN
##  0.169372297  0.005991298 -0.116735981 -0.141542794 -0.046966945  0.294439861
## [1] "-----------------"
## [1] "Variable: ORAL"
## [1] "Combinación lineal en cada componente:"
##        CONT        INTG        DMNR        DILG        CFMG        DECI
## -0.03452922 -0.37748813 -0.12329552 -0.02924283  0.26897827 -0.40752158
##        PREP        FAMI        ORAL        WRIT        PHYS        RTEN
##  0.07226971 -0.22947394  0.27199080 -0.06726958 -0.27452313  0.62456547
## [1] "-----------------"
## [1] "Variable: WRIT"
## [1] "Combinación lineal en cada componente:"
##        CONT        INTG        DMNR        DILG        CFMG        DECI
## -0.02698275  0.18025018 -0.03720489 -0.41571794  0.13173613  0.09720424
##        PREP        FAMI        ORAL        WRIT        PHYS        RTEN
##  0.64066551  0.12291413 -0.35542800 -0.43503830 -0.02638736  0.15469084
## [1] "-----------------"
## [1] "Variable: PHYS"
## [1] "Combinación lineal en cada componente:"
##        CONT        INTG        DMNR        DILG        CFMG        DECI
##  0.01671326 -0.15992927  0.11310307  0.09706351  0.19431559 -0.18697238
##        PREP        FAMI        ORAL        WRIT        PHYS        RTEN
## -0.34000143  0.53543928 -0.63676735  0.10601295 -0.01173895  0.24508578
## [1] "-----------------"
## [1] "Variable: RTEN"
## [1] "Combinación lineal en cada componente:"
##         CONT         INTG         DMNR         DILG         CFMG         DECI
##  0.007431325 -0.006194162 -0.055818131 -0.059529611 -0.040188043 -0.045701668
##         PREP         FAMI         ORAL         WRIT         PHYS         RTEN
##  0.293499296 -0.467666232 -0.429930400  0.702784185  0.056591229  0.052358190
## [1] "-----------------"
```

(b) Cargue el paquete ggbiplot y trace los dos primeros componentes con la función ggbiplot (). Puede etiquetar cada punto con el nombre del abogado configurando el parámetro etiquetas.

```
# Cambiar nombre a columna
dfJudge %>% rename(Nombre=X)
```

```
##             Nombre CONT INTG DMNR DILG CFMG DECI PREP FAMI ORAL WRIT PHYS RTEN
## 1    AARONSON,L.H.  5.7  7.9  7.7  7.3  7.1  7.4  7.1  7.1  7.1  7.0  8.3  7.8
## 2   ALEXANDER,J.M.  6.8  8.9  8.8  8.5  7.8  8.1  8.0  8.0  7.8  7.9  8.5  8.7
## 3   ARMENTANO,A.J.  7.2  8.1  7.8  7.8  7.5  7.6  7.5  7.5  7.3  7.4  7.9  7.8
## 4      BERDON,R.I.  6.8  8.8  8.5  8.8  8.3  8.5  8.7  8.7  8.4  8.5  8.8  8.7
## 5     BRACKEN,J.J.  7.3  6.4  4.3  6.5  6.0  6.2  5.7  5.7  5.1  5.3  5.5  4.8
## 6       BURNS,E.B.  6.2  8.8  8.7  8.5  7.9  8.0  8.1  8.0  8.0  8.0  8.6  8.6
## 7    CALLAHAN,R.J. 10.6  9.0  8.9  8.7  8.5  8.5  8.5  8.5  8.6  8.4  9.1  9.0
## 8       COHEN,S.S.  7.0  5.9  4.9  5.1  5.4  5.9  4.8  5.1  4.7  4.9  6.8  5.0
## 9        DALY,J.J.  7.3  8.9  8.9  8.7  8.6  8.5  8.4  8.4  8.4  8.5  8.8  8.8
```

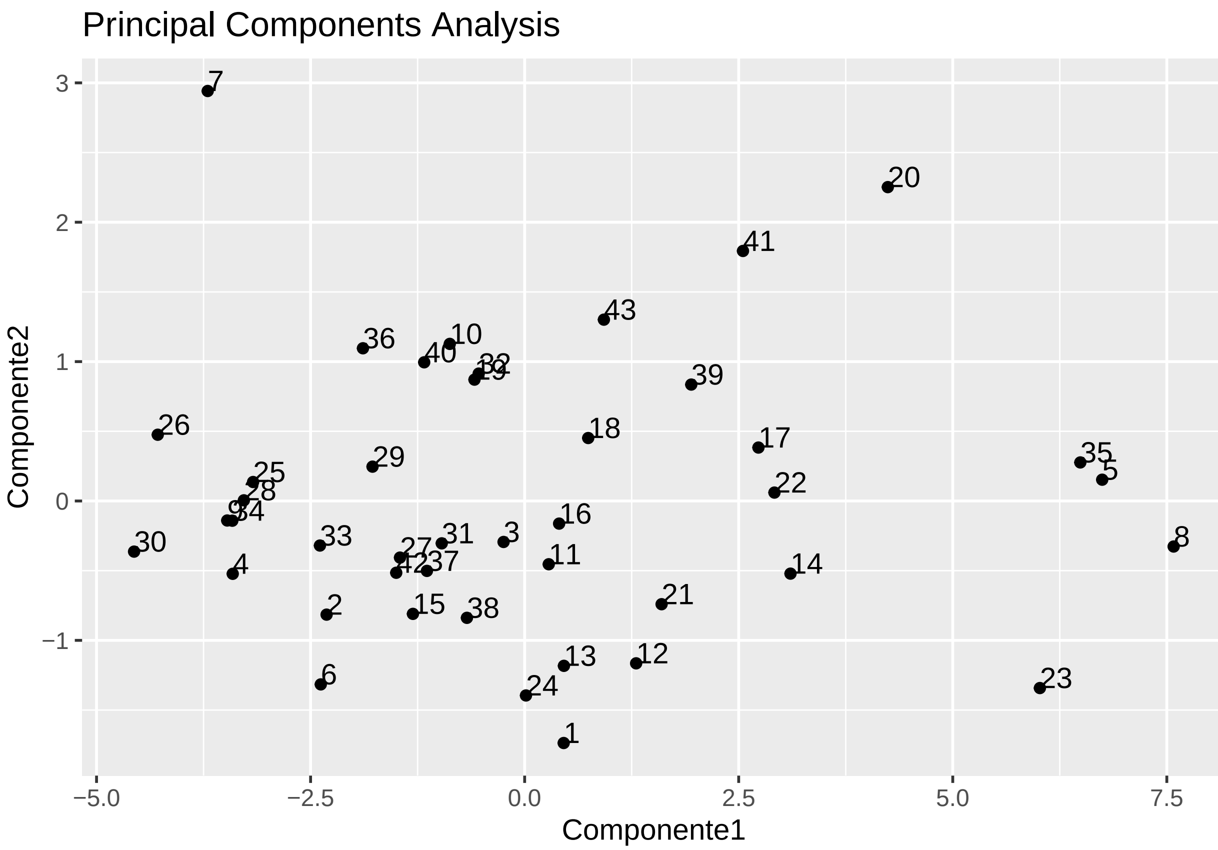
```
## 10    DANNEHY,J.F.  8.2  7.9  6.7  8.1  7.9  8.0  7.9  8.1  7.7  7.8  8.5  7.9
## 11       DEAN,H.H.  7.0  8.0  7.6  7.4  7.3  7.5  7.1  7.2  7.1  7.2  8.4  7.7
## 12     DEVITA,H.J.  6.5  8.0  7.6  7.2  7.0  7.1  6.9  7.0  7.0  7.1  6.9  7.2
## 13   DRISCOLL,P.J.  6.7  8.6  8.2  6.8  6.9  6.6  7.1  7.3  7.2  7.2  8.1  7.7
## 14     GRILLO,A.E.  7.0  7.5  6.4  6.8  6.5  7.0  6.6  6.8  6.3  6.6  6.2  6.5
## 15  HADDEN,W.L.JR.  6.5  8.1  8.0  8.0  7.9  8.0  7.9  7.8  7.8  7.8  8.4  8.0
## 16     HAMILL,E.C.  7.3  8.0  7.4  7.7  7.3  7.3  7.3  7.2  7.1  7.2  8.0  7.6
## 17     HEALEY.A.H.  8.0  7.6  6.6  7.2  6.5  6.5  6.8  6.7  6.4  6.5  6.9  6.7
## 18       HULL,T.C.  7.7  7.7  6.7  7.5  7.4  7.5  7.1  7.3  7.1  7.3  8.1  7.4
## 19       LEVINE,I.  8.3  8.2  7.4  7.8  7.7  7.7  7.7  7.8  7.5  7.6  8.0  8.0
## 20   LEVISTER,R.L.  9.6  6.9  5.7  6.6  6.9  6.6  6.2  6.0  5.8  5.8  7.2  6.0
## 21     MARTIN,L.F.  7.1  8.2  7.7  7.1  6.6  6.6  6.7  6.7  6.8  6.8  7.5  7.3
## 22    MCGRATH,J.F.  7.6  7.3  6.9  6.8  6.7  6.8  6.4  6.3  6.3  6.3  7.4  6.6
## 23    MIGNONE,A.F.  6.6  7.4  6.2  6.2  5.4  5.7  5.8  5.9  5.2  5.8  4.7  5.2
## 24     MISSAL,H.M.  6.2  8.3  8.1  7.7  7.4  7.3  7.3  7.3  7.2  7.3  7.8  7.6
## 25     MULVEY,H.M.  7.5  8.7  8.5  8.6  8.5  8.4  8.5  8.5  8.4  8.4  8.7  8.7
## 26      NARUK,H.J.  7.8  8.9  8.7  8.9  8.7  8.8  8.9  9.0  8.8  8.9  9.0  9.0
## 27    O'BRIEN,F.J.  7.1  8.5  8.3  8.0  7.9  7.9  7.8  7.8  7.8  7.7  8.3  8.2
## 28 O'SULLIVAN,T.J.  7.5  9.0  8.9  8.7  8.4  8.5  8.4  8.3  8.3  8.3  8.8  8.7
## 29       PASKEY,L.  7.5  8.1  7.7  8.2  8.0  8.1  8.2  8.4  8.0  8.1  8.4  8.1
## 30    RUBINOW,J.E.  7.1  9.2  9.0  9.0  8.4  8.6  9.1  9.1  8.9  9.0  8.9  9.2
## 31      SADEN.G.A.  6.6  7.4  6.9  8.4  8.0  7.9  8.2  8.4  7.7  7.9  8.4  7.5
## 32 SATANIELLO,A.G.  8.4  8.0  7.9  7.9  7.8  7.8  7.6  7.4  7.4  7.4  8.1  7.9
## 33       SHEA,D.M.  6.9  8.5  7.8  8.5  8.1  8.2  8.4  8.5  8.1  8.3  8.7  8.3
## 34    SHEA,J.F.JR.  7.3  8.9  8.8  8.7  8.4  8.5  8.5  8.5  8.4  8.4  8.8  8.8
## 35      SIDOR,W.J.  7.7  6.2  5.1  5.6  5.6  5.9  5.6  5.6  5.3  5.5  6.3  5.3
## 36   SPEZIALE,J.A.  8.5  8.3  8.1  8.3  8.4  8.2  8.2  8.1  7.9  8.0  8.0  8.2
## 37     SPONZO,M.J.  6.9  8.3  8.0  8.1  7.9  7.9  7.9  7.7  7.6  7.7  8.1  8.0
## 38  STAPLETON,J.F.  6.5  8.2  7.7  7.8  7.6  7.7  7.7  7.7  7.5  7.6  8.5  7.7
## 39      TESTO,R.J.  8.3  7.3  7.0  6.8  7.0  7.1  6.7  6.7  6.7  6.7  8.0  7.0
## 40 TIERNEY,W.L.JR.  8.3  8.2  7.8  8.3  8.4  8.3  7.7  7.6  7.5  7.7  8.1  7.9
## 41       WALL,R.A.  9.0  7.0  5.9  7.0  7.0  7.2  6.9  6.9  6.5  6.6  7.6  6.6
## 42     WRIGHT,D.B.  7.1  8.4  8.4  7.7  7.5  7.7  7.8  8.2  8.0  8.1  8.3  8.1
## 43   ZARRILLI,K.J.  8.6  7.4  7.0  7.5  7.5  7.7  7.4  7.2  6.9  7.0  7.8  7.1
```

No se puede imprimir las etiquetas con nombres de los abogados, por lo que se procede a imprimir sin las etiquetas de nombre de abogados

```
library(ggplot2)

# Crear un dataframe con los componentes principales y los nombres de los abogados
df_plot <- data.frame(Componente1 = componentes[, 1], Componente2 = componentes[, 2], Abogado = rowname

# Trama de dispersión de los componentes principales
ggplot(df_plot, aes(x = Componente1, y = Componente2, label = Abogado)) +
  geom_point() +
  geom_text(hjust = 0, vjust = 0)+
  ggtitle("Principal Components Analysis")
```


Principal Components Analysis
Componente2
Componente1
3
2
1
0
−1
−5.0
−2.5
0.0
2.5
5.0
7.5
7
20
41
43
36
10
40
32
19
39
26
18
17
29
35
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5
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2
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38
13
12
6
24
23
1