RWorksheet_Pineda#4c.Rmd

2023-11-27

#1.a

```
library(readr)

mpg <- read_csv("mpg.csv")
```

```
## New names:
## Rows: 234 Columns: 12
## -- Column specification
## -------------------------------------------------------- Delimiter: "," chr
## (6): manufacturer, model, trans, drv, fl, class dbl (6): ...1, displ, year,
## cyl, cty, hwy
## i Use `spec()` to retrieve the full column specification for this data. i
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## * `` -> `...1`
```

```
mpg
```

```
## # A tibble: 234 x 12
##     ...1 manufacturer model      displ  year   cyl trans drv     cty   hwy fl
##    <dbl> <chr>        <chr>      <dbl> <dbl> <dbl> <chr> <chr> <dbl> <dbl> <chr>
##  1     1 audi         a4           1.8  1999     4 auto~ f        18    29 p
##  2     2 audi         a4           1.8  1999     4 manu~ f        21    29 p
##  3     3 audi         a4           2    2008     4 manu~ f        20    31 p
##  4     4 audi         a4           2    2008     4 auto~ f        21    30 p
##  5     5 audi         a4           2.8  1999     6 auto~ f        16    26 p
##  6     6 audi         a4           2.8  1999     6 manu~ f        18    26 p
##  7     7 audi         a4           3.1  2008     6 auto~ f        18    27 p
##  8     8 audi         a4 quattro   1.8  1999     4 manu~ 4        18    26 p
##  9     9 audi         a4 quattro   1.8  1999     4 auto~ 4        16    25 p
## 10    10 audi         a4 quattro   2    2008     4 manu~ 4        20    28 p
## # i 224 more rows
## # i 1 more variable: class <chr>
```

#1.b

```
str(mpg)
```

```
## spc_tbl_ [234 x 12] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ ...1        : num [1:234] 1 2 3 4 5 6 7 8 9 10 ...
##  $ manufacturer: chr [1:234] "audi" "audi" "audi" "audi" ...
##  $ model       : chr [1:234] "a4" "a4" "a4" "a4" ...
##  $ displ       : num [1:234] 1.8 1.8 2 2 2.8 2.8 3.1 1.8 1.8 2 ...
##  $ year        : num [1:234] 1999 1999 2008 2008 1999 ...
##  $ cyl         : num [1:234] 4 4 4 4 6 6 6 4 4 4 ...
##  $ trans       : chr [1:234] "auto(l5)" "manual(m5)" "manual(m6)" "auto(av)" ...
##  $ drv         : chr [1:234] "f" "f" "f" "f" ...
##  $ cty         : num [1:234] 18 21 20 21 16 18 18 18 16 20 ...
```

```
##  $ hwy         : num [1:234] 29 29 31 30 26 26 27 26 25 28 ...
##  $ fl          : chr [1:234] "p" "p" "p" "p" ...
##  $ class       : chr [1:234] "compact" "compact" "compact" "compact" ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   ...1 = col_double(),
##   ..   manufacturer = col_character(),
##   ..   model = col_character(),
##   ..   displ = col_double(),
##   ..   year = col_double(),
##   ..   cyl = col_double(),
##   ..   trans = col_character(),
##   ..   drv = col_character(),
##   ..   cty = col_double(),
##   ..   hwy = col_double(),
##   ..   fl = col_character(),
##   ..   class = col_character()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

```
#The variables manufacturer, model, trans, drv, fl, and class are categorical.
```

#1.c

```
str(mpg)
```

```
## spc_tbl_ [234 x 12] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ ...1        : num [1:234] 1 2 3 4 5 6 7 8 9 10 ...
##  $ manufacturer: chr [1:234] "audi" "audi" "audi" "audi" ...
##  $ model       : chr [1:234] "a4" "a4" "a4" "a4" ...
##  $ displ       : num [1:234] 1.8 1.8 2 2 2.8 2.8 3.1 1.8 1.8 2 ...
##  $ year        : num [1:234] 1999 1999 2008 2008 1999 ...
##  $ cyl         : num [1:234] 4 4 4 4 6 6 6 4 4 4 ...
##  $ trans       : chr [1:234] "auto(l5)" "manual(m5)" "manual(m6)" "auto(av)" ...
##  $ drv         : chr [1:234] "f" "f" "f" "f" ...
##  $ cty         : num [1:234] 18 21 20 21 16 18 18 18 16 20 ...
##  $ hwy         : num [1:234] 29 29 31 30 26 26 27 26 25 28 ...
##  $ fl          : chr [1:234] "p" "p" "p" "p" ...
##  $ class       : chr [1:234] "compact" "compact" "compact" "compact" ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   ...1 = col_double(),
##   ..   manufacturer = col_character(),
##   ..   model = col_character(),
##   ..   displ = col_double(),
##   ..   year = col_double(),
##   ..   cyl = col_double(),
##   ..   trans = col_character(),
##   ..   drv = col_character(),
##   ..   cty = col_double(),
##   ..   hwy = col_double(),
##   ..   fl = col_character(),
##   ..   class = col_character()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

```
#The continuous variables are displ, year, cyl, cty, and hwy.
```

#2

```
Manufacturer_asTable <- table(mpg$manufacturer)
MostModels_Manufacturer <- names(Manufacturer_asTable)[which.max(Manufacturer_asTable)]

MostModels_Manufacturer
```

```
## [1] "dodge"
```

```
#Dodge Manufacturer has the most models.

Model_asTable <- table(mpg$model)
MostModelsvars <- names(Model_asTable)[which.max(Model_asTable)]

MostModelsvars
```

```
## [1] "caravan 2wd"
```

```
#Caravan 2wd has the most variants.
```

#2.a

```
library(dplyr)
```

```
##
## 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
```

```
ManufacturerModels <- data.frame(Manufacturer = mpg$manufacturer, Model = mpg$model)
ManufacturerModels
```

```
##     Manufacturer                Model
## 1           audi                   a4
## 2           audi                   a4
## 3           audi                   a4
## 4           audi                   a4
## 5           audi                   a4
## 6           audi                   a4
## 7           audi                   a4
## 8           audi           a4 quattro
## 9           audi           a4 quattro
## 10          audi           a4 quattro
## 11          audi           a4 quattro
## 12          audi           a4 quattro
## 13          audi           a4 quattro
## 14          audi           a4 quattro
## 15          audi           a4 quattro
## 16          audi           a6 quattro
## 17          audi           a6 quattro
## 18          audi           a6 quattro
```

```
## 19     chevrolet     c1500 suburban 2wd
## 20     chevrolet     c1500 suburban 2wd
## 21     chevrolet     c1500 suburban 2wd
## 22     chevrolet     c1500 suburban 2wd
## 23     chevrolet     c1500 suburban 2wd
## 24     chevrolet              corvette
## 25     chevrolet              corvette
## 26     chevrolet              corvette
## 27     chevrolet              corvette
## 28     chevrolet              corvette
## 29     chevrolet        k1500 tahoe 4wd
## 30     chevrolet        k1500 tahoe 4wd
## 31     chevrolet        k1500 tahoe 4wd
## 32     chevrolet        k1500 tahoe 4wd
## 33     chevrolet                malibu
## 34     chevrolet                malibu
## 35     chevrolet                malibu
## 36     chevrolet                malibu
## 37     chevrolet                malibu
## 38         dodge            caravan 2wd
## 39         dodge            caravan 2wd
## 40         dodge            caravan 2wd
## 41         dodge            caravan 2wd
## 42         dodge            caravan 2wd
## 43         dodge            caravan 2wd
## 44         dodge            caravan 2wd
## 45         dodge            caravan 2wd
## 46         dodge            caravan 2wd
## 47         dodge            caravan 2wd
## 48         dodge            caravan 2wd
## 49         dodge      dakota pickup 4wd
## 50         dodge      dakota pickup 4wd
## 51         dodge      dakota pickup 4wd
## 52         dodge      dakota pickup 4wd
## 53         dodge      dakota pickup 4wd
## 54         dodge      dakota pickup 4wd
## 55         dodge      dakota pickup 4wd
## 56         dodge      dakota pickup 4wd
## 57         dodge      dakota pickup 4wd
## 58         dodge            durango 4wd
## 59         dodge            durango 4wd
## 60         dodge            durango 4wd
## 61         dodge            durango 4wd
## 62         dodge            durango 4wd
## 63         dodge            durango 4wd
## 64         dodge            durango 4wd
## 65         dodge    ram 1500 pickup 4wd
## 66         dodge    ram 1500 pickup 4wd
## 67         dodge    ram 1500 pickup 4wd
## 68         dodge    ram 1500 pickup 4wd
## 69         dodge    ram 1500 pickup 4wd
## 70         dodge    ram 1500 pickup 4wd
## 71         dodge    ram 1500 pickup 4wd
## 72         dodge    ram 1500 pickup 4wd
```

```
## 73         dodge    ram 1500 pickup 4wd
## 74         dodge    ram 1500 pickup 4wd
## 75          ford         expedition 2wd
## 76          ford         expedition 2wd
## 77          ford         expedition 2wd
## 78          ford           explorer 4wd
## 79          ford           explorer 4wd
## 80          ford           explorer 4wd
## 81          ford           explorer 4wd
## 82          ford           explorer 4wd
## 83          ford           explorer 4wd
## 84          ford        f150 pickup 4wd
## 85          ford        f150 pickup 4wd
## 86          ford        f150 pickup 4wd
## 87          ford        f150 pickup 4wd
## 88          ford        f150 pickup 4wd
## 89          ford        f150 pickup 4wd
## 90          ford        f150 pickup 4wd
## 91          ford                mustang
## 92          ford                mustang
## 93          ford                mustang
## 94          ford                mustang
## 95          ford                mustang
## 96          ford                mustang
## 97          ford                mustang
## 98          ford                mustang
## 99          ford                mustang
## 100        honda                  civic
## 101        honda                  civic
## 102        honda                  civic
## 103        honda                  civic
## 104        honda                  civic
## 105        honda                  civic
## 106        honda                  civic
## 107        honda                  civic
## 108        honda                  civic
## 109      hyundai                 sonata
## 110      hyundai                 sonata
## 111      hyundai                 sonata
## 112      hyundai                 sonata
## 113      hyundai                 sonata
## 114      hyundai                 sonata
## 115      hyundai                 sonata
## 116      hyundai                tiburon
## 117      hyundai                tiburon
## 118      hyundai                tiburon
## 119      hyundai                tiburon
## 120      hyundai                tiburon
## 121      hyundai                tiburon
## 122      hyundai                tiburon
## 123         jeep     grand cherokee 4wd
## 124         jeep     grand cherokee 4wd
## 125         jeep     grand cherokee 4wd
## 126         jeep     grand cherokee 4wd
```

```
## 127         jeep     grand cherokee 4wd
## 128         jeep     grand cherokee 4wd
## 129         jeep     grand cherokee 4wd
## 130         jeep     grand cherokee 4wd
## 131   land rover            range rover
## 132   land rover            range rover
## 133   land rover            range rover
## 134   land rover            range rover
## 135      lincoln          navigator 2wd
## 136      lincoln          navigator 2wd
## 137      lincoln          navigator 2wd
## 138      mercury        mountaineer 4wd
## 139      mercury        mountaineer 4wd
## 140      mercury        mountaineer 4wd
## 141      mercury        mountaineer 4wd
## 142       nissan                altima
## 143       nissan                altima
## 144       nissan                altima
## 145       nissan                altima
## 146       nissan                altima
## 147       nissan                altima
## 148       nissan                maxima
## 149       nissan                maxima
## 150       nissan                maxima
## 151       nissan         pathfinder 4wd
## 152       nissan         pathfinder 4wd
## 153       nissan         pathfinder 4wd
## 154       nissan         pathfinder 4wd
## 155      pontiac             grand prix
## 156      pontiac             grand prix
## 157      pontiac             grand prix
## 158      pontiac             grand prix
## 159      pontiac             grand prix
## 160       subaru           forester awd
## 161       subaru           forester awd
## 162       subaru           forester awd
## 163       subaru           forester awd
## 164       subaru           forester awd
## 165       subaru           forester awd
## 166       subaru            impreza awd
## 167       subaru            impreza awd
## 168       subaru            impreza awd
## 169       subaru            impreza awd
## 170       subaru            impreza awd
## 171       subaru            impreza awd
## 172       subaru            impreza awd
## 173       subaru            impreza awd
## 174       toyota            4runner 4wd
## 175       toyota            4runner 4wd
## 176       toyota            4runner 4wd
## 177       toyota            4runner 4wd
## 178       toyota            4runner 4wd
## 179       toyota            4runner 4wd
## 180       toyota                  camry
```

```
## 181       toyota                 camry
## 182       toyota                 camry
## 183       toyota                 camry
## 184       toyota                 camry
## 185       toyota                 camry
## 186       toyota                 camry
## 187       toyota           camry solara
## 188       toyota           camry solara
## 189       toyota           camry solara
## 190       toyota           camry solara
## 191       toyota           camry solara
## 192       toyota           camry solara
## 193       toyota           camry solara
## 194       toyota                corolla
## 195       toyota                corolla
## 196       toyota                corolla
## 197       toyota                corolla
## 198       toyota                corolla
## 199       toyota land cruiser wagon 4wd
## 200       toyota land cruiser wagon 4wd
## 201       toyota      toyota tacoma 4wd
## 202       toyota      toyota tacoma 4wd
## 203       toyota      toyota tacoma 4wd
## 204       toyota      toyota tacoma 4wd
## 205       toyota      toyota tacoma 4wd
## 206       toyota      toyota tacoma 4wd
## 207       toyota      toyota tacoma 4wd
## 208   volkswagen                  gti
## 209   volkswagen                  gti
## 210   volkswagen                  gti
## 211   volkswagen                  gti
## 212   volkswagen                  gti
## 213   volkswagen                jetta
## 214   volkswagen                jetta
## 215   volkswagen                jetta
## 216   volkswagen                jetta
## 217   volkswagen                jetta
## 218   volkswagen                jetta
## 219   volkswagen                jetta
## 220   volkswagen                jetta
## 221   volkswagen                jetta
## 222   volkswagen            new beetle
## 223   volkswagen            new beetle
## 224   volkswagen            new beetle
## 225   volkswagen            new beetle
## 226   volkswagen            new beetle
## 227   volkswagen            new beetle
## 228   volkswagen                passat
## 229   volkswagen                passat
## 230   volkswagen                passat
## 231   volkswagen                passat
## 232   volkswagen                passat
## 233   volkswagen                passat
## 234   volkswagen                passat
```

```r
Unique_Models <- unique(ManufacturerModels)
Unique_Models
```

```
##     Manufacturer                 Model
## 1           audi                    a4
## 8           audi             a4 quattro
## 16          audi             a6 quattro
## 19     chevrolet     c1500 suburban 2wd
## 24     chevrolet               corvette
## 29     chevrolet        k1500 tahoe 4wd
## 33     chevrolet                malibu
## 38         dodge            caravan 2wd
## 49         dodge      dakota pickup 4wd
## 58         dodge            durango 4wd
## 65         dodge    ram 1500 pickup 4wd
## 75          ford         expedition 2wd
## 78          ford           explorer 4wd
## 84          ford        f150 pickup 4wd
## 91          ford                mustang
## 100        honda                  civic
## 109      hyundai                 sonata
## 116      hyundai                tiburon
## 123         jeep     grand cherokee 4wd
## 131   land rover            range rover
## 135      lincoln          navigator 2wd
## 138      mercury        mountaineer 4wd
## 142       nissan                altima
## 148       nissan                maxima
## 151       nissan         pathfinder 4wd
## 155      pontiac             grand prix
## 160       subaru           forester awd
## 166       subaru            impreza awd
## 174       toyota            4runner 4wd
## 180       toyota                 camry
## 187       toyota           camry solara
## 194       toyota                corolla
## 199       toyota land cruiser wagon 4wd
## 201       toyota      toyota tacoma 4wd
## 208   volkswagen                   gti
## 213   volkswagen                 jetta
## 222   volkswagen             new beetle
## 228   volkswagen                 passat
```

```r
Factor_UniqueModels <- Factored_Manufacturer <- as.factor(Unique_Models$Manufacturer)
```

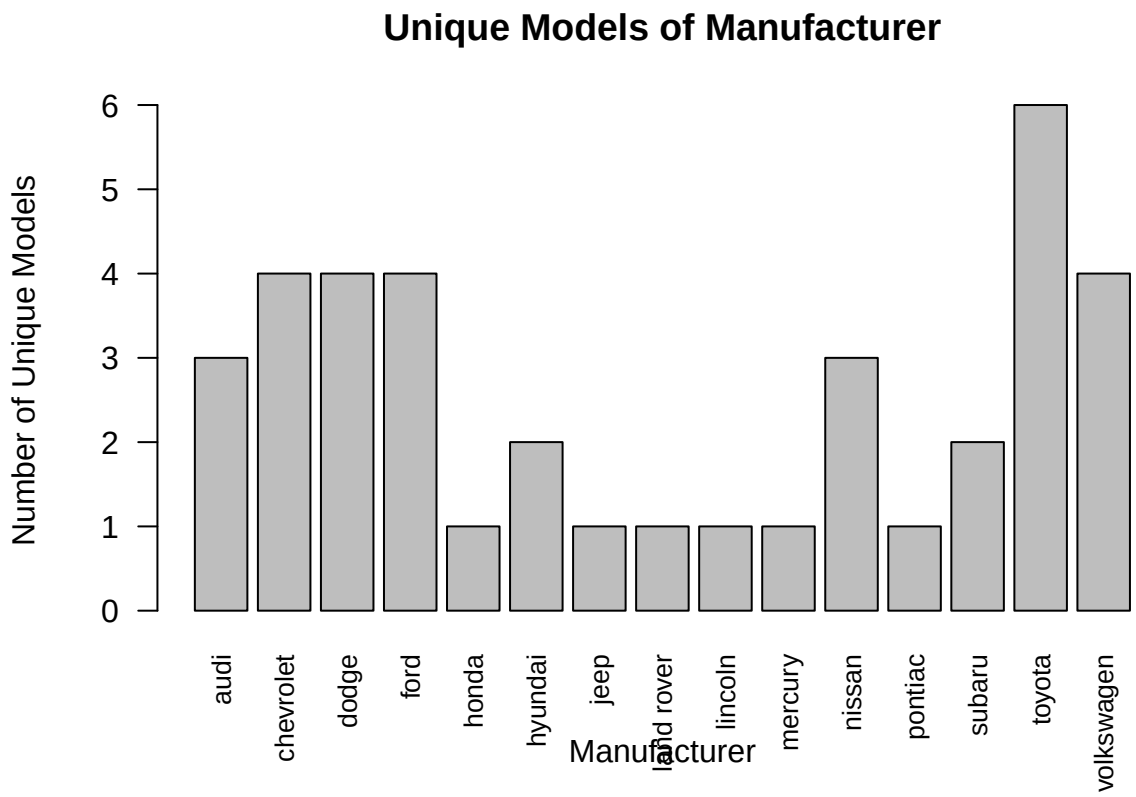
#2.b

```r
library(ggplot2)
```

```
##
## Attaching package: 'ggplot2'
```

```
## The following object is masked _by_ '.GlobalEnv':
##
##     mpg
```

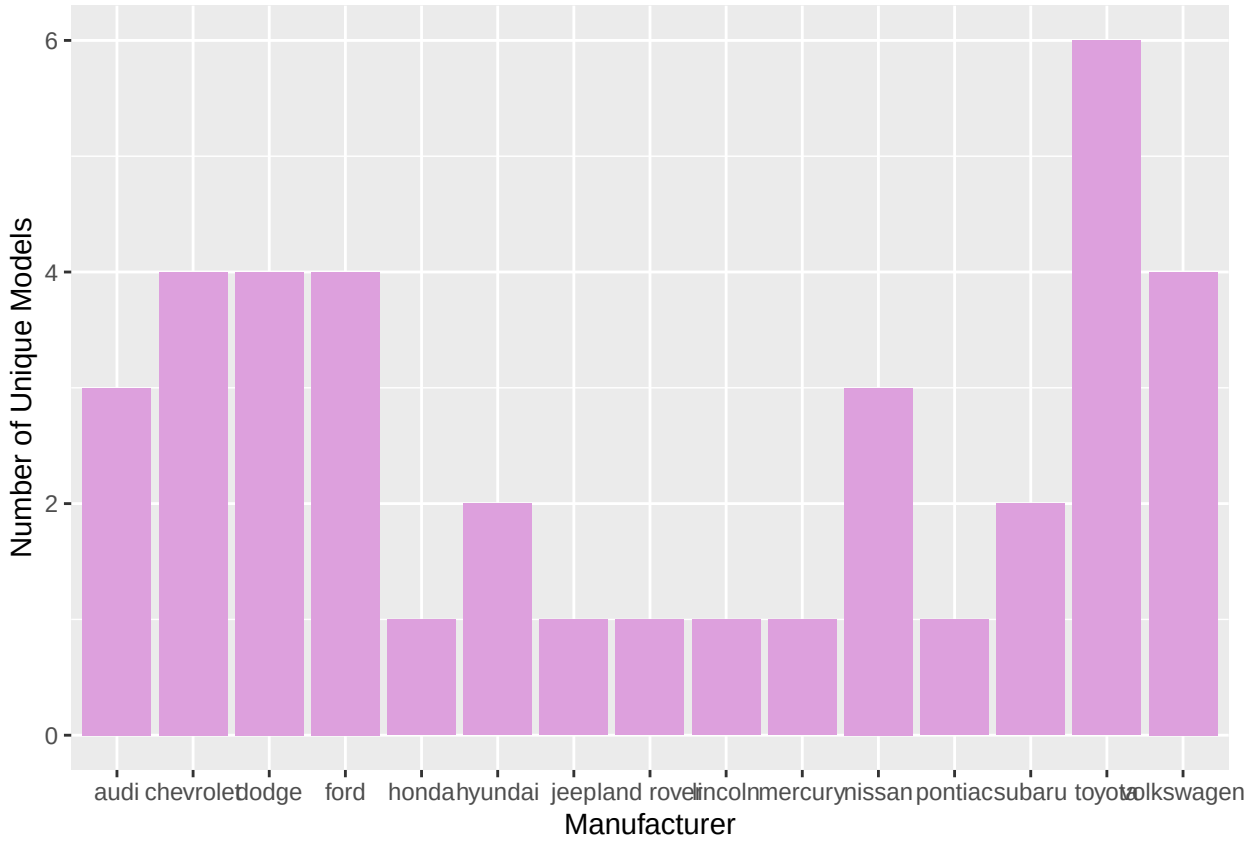
```
library(dplyr)

UniquePlot <- plot(as.factor(Factored_Manufacturer),
                   main = "Unique Models of Manufacturer",
                   xlab = "Manufacturer",
                   ylab = "Number of Unique Models",
                   cex.names = 0.8, las = 2)
```




```
UniqueCount <- Unique_Models %>%
  count(Unique_Models$Manufacturer)
UniqueCount
```

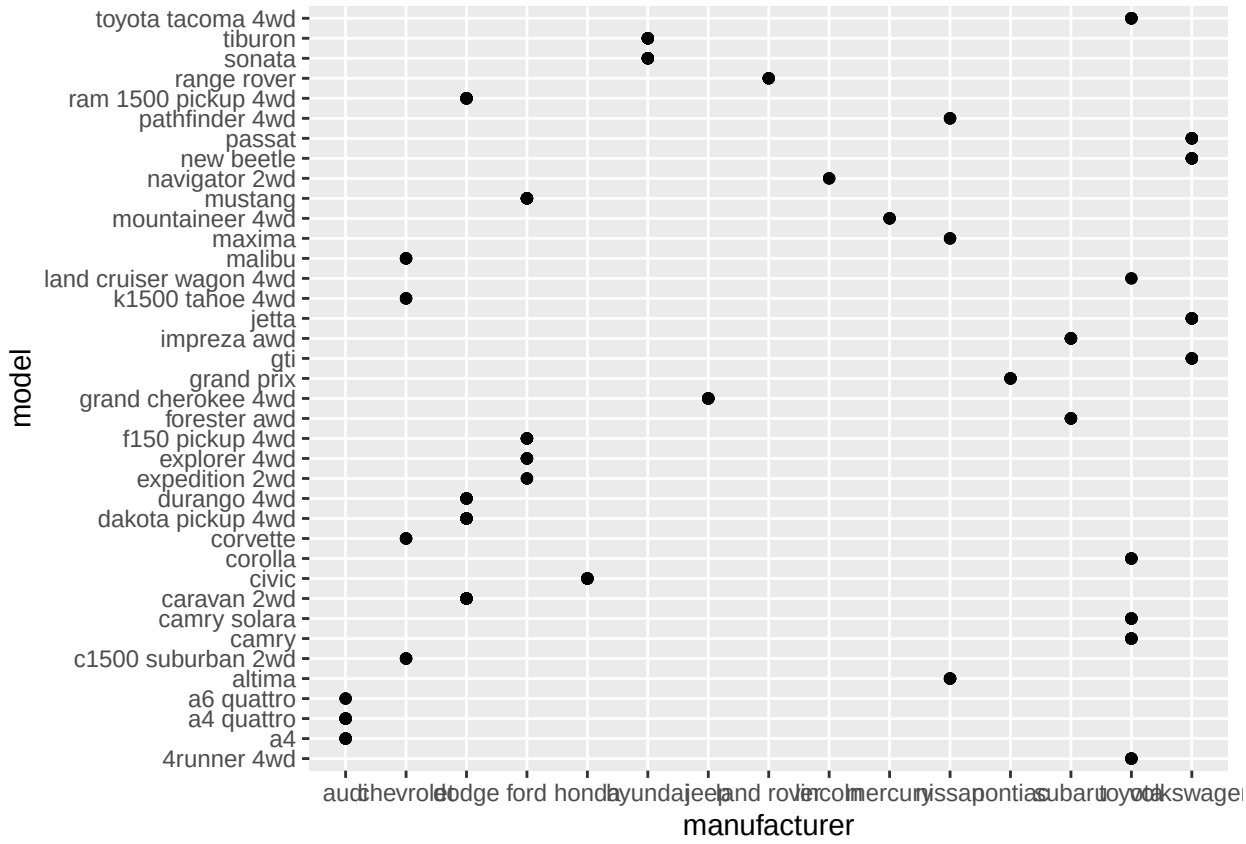
```
##    Unique_Models$Manufacturer n
## 1                        audi 3
## 2                   chevrolet 4
## 3                       dodge 4
## 4                        ford 4
## 5                       honda 1
## 6                      hyundai 2
## 7                        jeep 1
## 8                  land rover 1
## 9                     lincoln 1
## 10                    mercury 1
## 11                     nissan 3
## 12                    pontiac 1
## 13                     subaru 2
## 14                     toyota 6
## 15                 volkswagen 4
```

```
ggplot(UniqueCount, aes(x = `Unique_Models$Manufacturer`, y = n)) + geom_bar(stat = "identity", fill =
  labs(x = "Manufacturer", y = "Number of Unique Models")
```



#2a

```
ggplot(mpg, aes(manufacturer, model)) + geom_point()
```



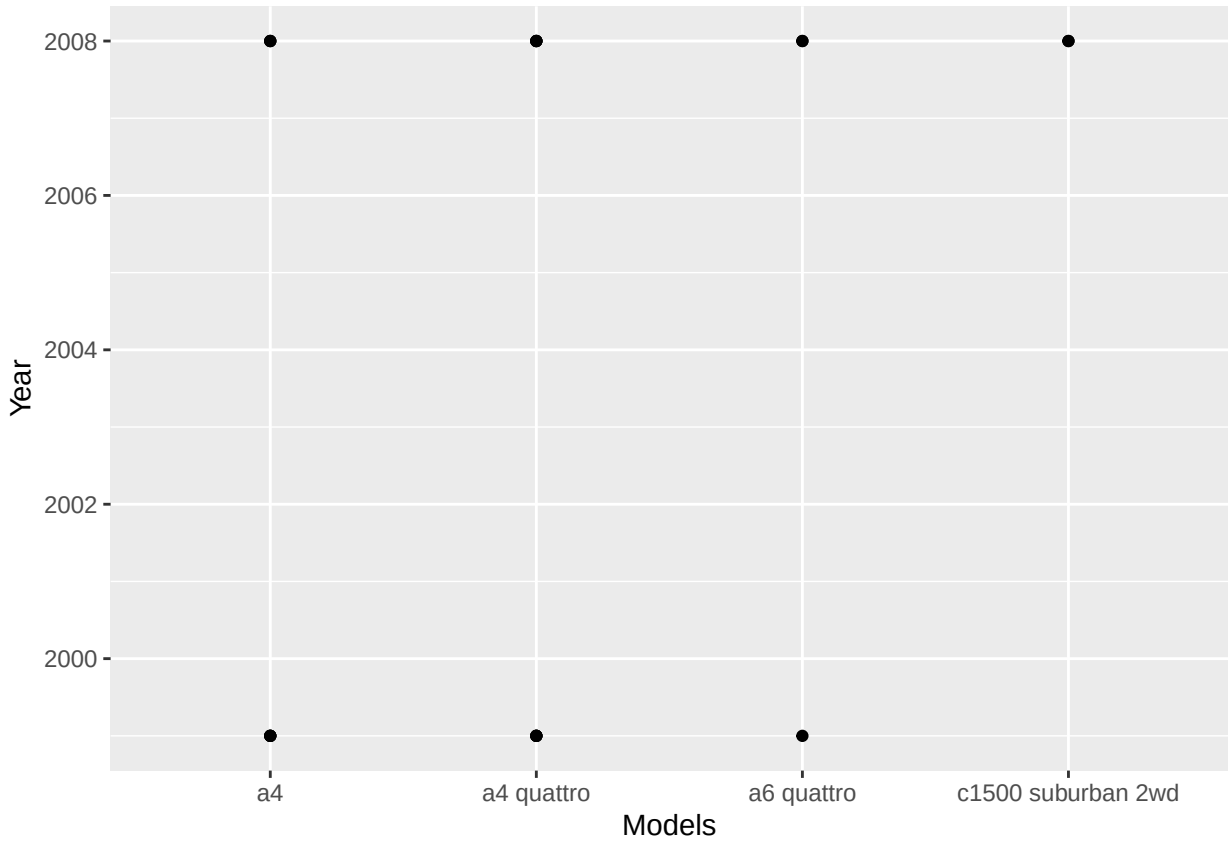

```
#It generates a scatterplot of the mpg dataset, with model on the x-axis and manufacturer on the y-axis
#In this plot, each point represents a specific model and its related manufacturer.
```

#2b

```
#This information is useful for determining the number of models produced by each manufacturer.
#To make it more interesting, I could add color-coded points that reflect the class variable and labels
```

#3

```
Top20 <- head(mpg,20)

Top20Plot <- ggplot(Top20, aes(x = model, y = year)) + geom_point() + labs(x = "Models", y = "Year")
Top20Plot
```



#4

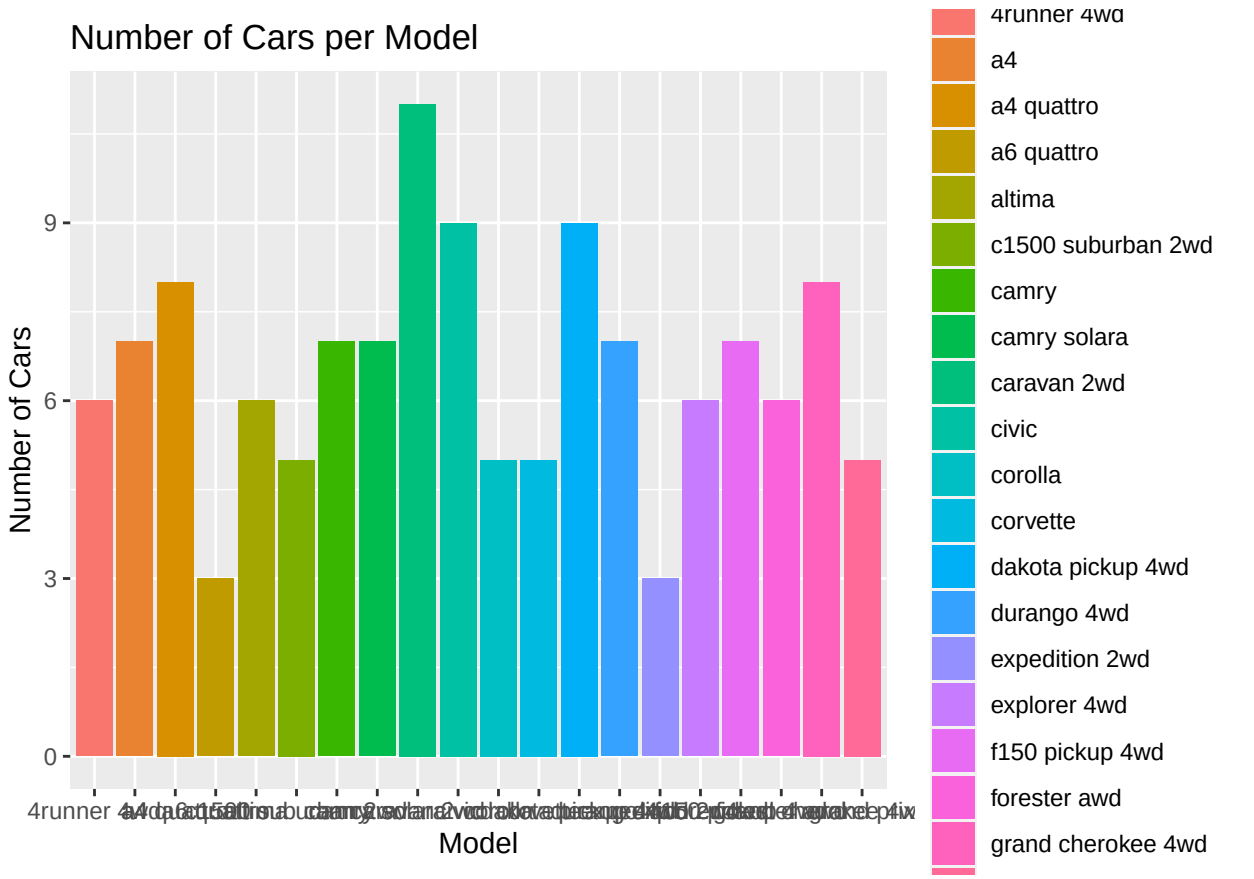
```
library(dplyr)

Model_CarCount <- mpg %>%
  group_by(model) %>%
  summarize(number_cars = n())
Model_CarCount
```

```
## # A tibble: 38 x 2
##    model              number_cars
##    <chr>                    <int>
##  1 4runner 4wd                  6
##  2 a4                           7
##  3 a4 quattro                   8
##  4 a6 quattro                   3
##  5 altima                       6
##  6 c1500 suburban 2wd           5
##  7 camry                        7
##  8 camry solara                 7
##  9 caravan 2wd                 11
## 10 civic                        9
## # i 28 more rows
```

#4.a

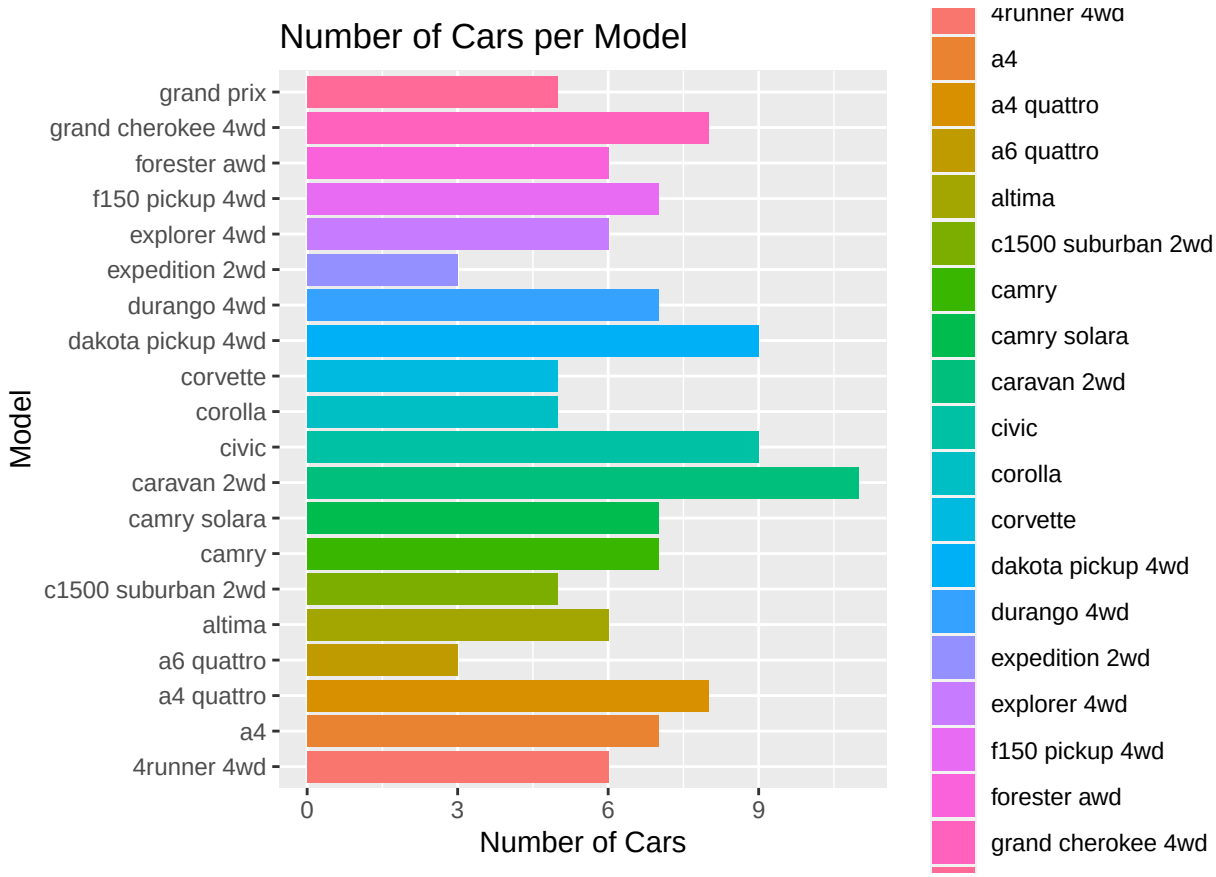
```
Observation20 <- head(Model_CarCount, 20)

Top20 <- ggplot(Observation20, aes(x = model, y = number_cars, fill = model)) + geom_bar(stat = "identi
```

```
Top20
```



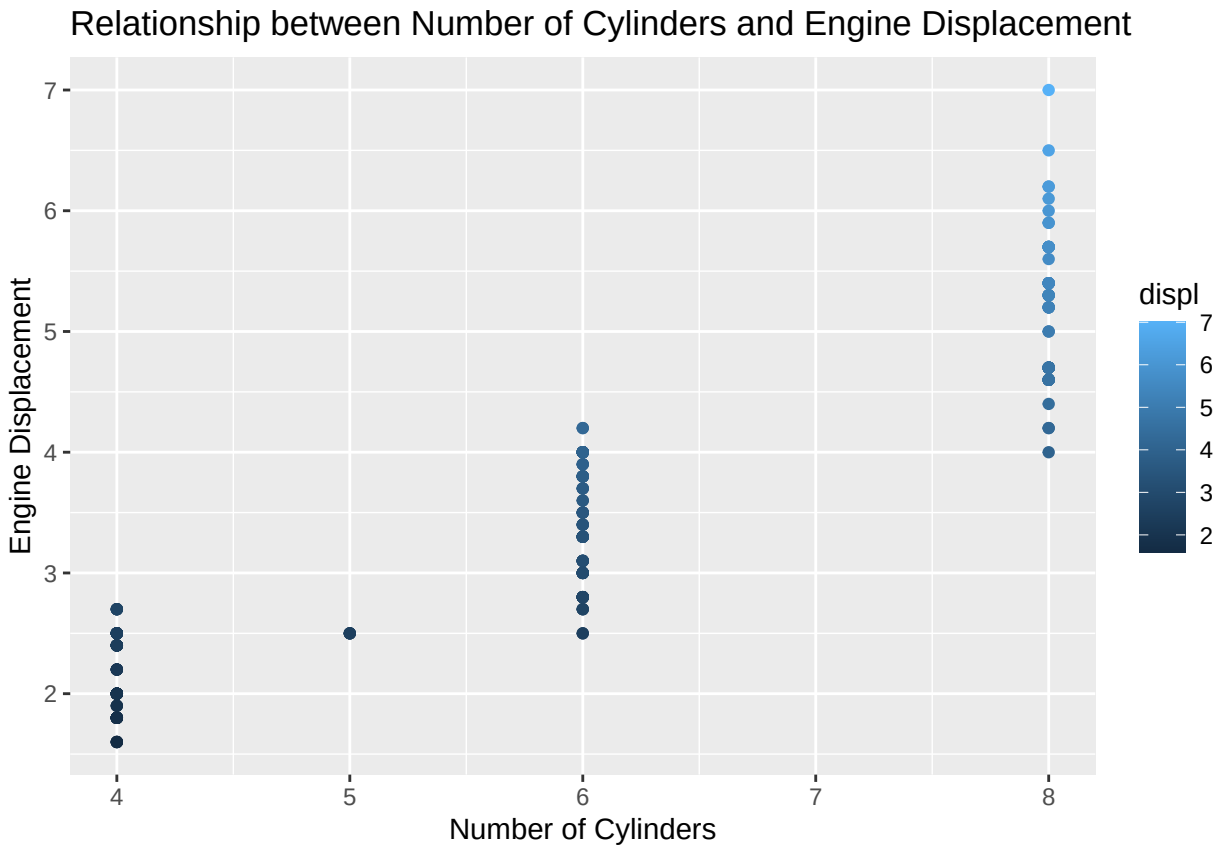
#4.b

```
Flipped_Top20 <- ggplot(Observation20, aes(x = model, y = number_cars, fill = model)) + geom_bar(stat =
Flipped_Top20
```



#5

```
CylDispl_Plot <- ggplot(mpg, aes(x = cyl, y = displ, color = displ)) + geom_point() + labs(title = "Rela
CylDispl_Plot
```

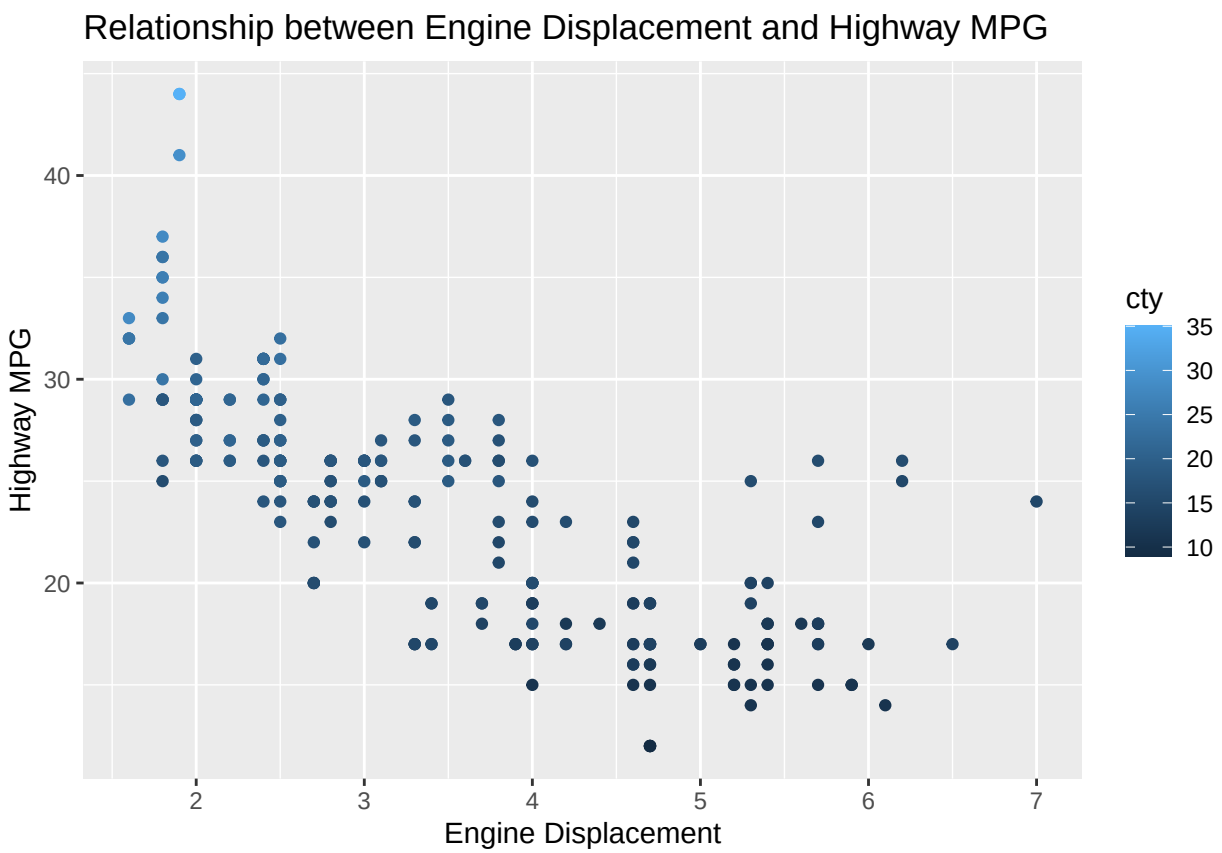


#5.a

```
#It will generate a scatterplot illustrating the link between cylinder count and engine displacement. E
#As the number of cylinders increases, so does the displacement of the engine. This shows that larger e
```

#6

```
DisplHwy_Plot <- ggplot(mpg, aes(x = displ, y= hwy, color = cty)) + geom_point() + labs(title = "Relati
DisplHwy_Plot
```


Relationship between Engine Displacement and Highway MPG
Highway MPG
40
30
20
2
3
4
5
6
7
Engine Displacement
cty
35
30
25
20
15
10