Worksheet 4c

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1. Use the dataset mpg

1a. Show your solutions on how to import a csv file into the environmen

```
mpg <- read.csv("mpg.csv")</pre>
```

1b. Which variables from mpg dataset are categorical?

```
# all the colums exept colum "X"
```

1c. Which are continuous variables?

mpg\$model

```
##
     [1] "a4"
                                    "a4"
                                                               "a4"
##
     [4] "a4"
                                    "a4"
                                                               "a4"
     [7] "a4"
##
                                    "a4 quattro"
                                                               "a4 quattro"
    [10] "a4 quattro"
                                    "a4 quattro"
                                                               "a4 quattro"
##
   [13] "a4 quattro"
                                    "a4 quattro"
                                                               "a4 quattro"
##
    [16] "a6 quattro"
                                    "a6 quattro"
                                                               "a6 quattro"
    [19] "c1500 suburban 2wd"
                                                               "c1500 suburban 2wd"
##
                                    "c1500 suburban 2wd"
    [22] "c1500 suburban 2wd"
                                    "c1500 suburban 2wd"
                                                               "corvette"
    [25] "corvette"
                                    "corvette"
                                                               "corvette"
##
   [28] "corvette"
                                    "k1500 tahoe 4wd"
                                                               "k1500 tahoe 4wd"
    [31] "k1500 tahoe 4wd"
                                    "k1500 tahoe 4wd"
                                                               "malibu"
##
##
    [34] "malibu"
                                    "malibu"
                                                               "malibu"
##
   [37] "malibu"
                                    "caravan 2wd"
                                                               "caravan 2wd"
##
   [40] "caravan 2wd"
                                    "caravan 2wd"
                                                               "caravan 2wd"
    [43] "caravan 2wd"
##
                                    "caravan 2wd"
                                                               "caravan 2wd"
##
    [46] "caravan 2wd"
                                    "caravan 2wd"
                                                               "caravan 2wd"
##
    [49] "dakota pickup 4wd"
                                    "dakota pickup 4wd"
                                                               "dakota pickup 4wd"
    [52] "dakota pickup 4wd"
                                                               "dakota pickup 4wd"
##
                                    "dakota pickup 4wd"
##
    [55] "dakota pickup 4wd"
                                    "dakota pickup 4wd"
                                                               "dakota pickup 4wd"
    [58] "durango 4wd"
                                    "durango 4wd"
                                                               "durango 4wd"
##
    [61] "durango 4wd"
                                    "durango 4wd"
                                                               "durango 4wd"
                                    "ram 1500 pickup 4wd"
##
    [64] "durango 4wd"
                                                               "ram 1500 pickup 4wd"
    [67] "ram 1500 pickup 4wd"
                                    "ram 1500 pickup 4wd"
                                                               "ram 1500 pickup 4wd"
##
##
    [70] "ram 1500 pickup 4wd"
                                    "ram 1500 pickup 4wd"
                                                               "ram 1500 pickup 4wd"
    [73] "ram 1500 pickup 4wd"
                                    "ram 1500 pickup 4wd"
                                                               "expedition 2wd"
    [76] "expedition 2wd"
                                    "expedition 2wd"
                                                               "explorer 4wd"
##
    [79] "explorer 4wd"
                                                               "explorer 4wd"
##
                                    "explorer 4wd"
##
   [82] "explorer 4wd"
                                    "explorer 4wd"
                                                               "f150 pickup 4wd"
    [85] "f150 pickup 4wd"
                                    "f150 pickup 4wd"
                                                               "f150 pickup 4wd"
##
    [88] "f150 pickup 4wd"
                                    "f150 pickup 4wd"
                                                               "f150 pickup 4wd"
##
    [91] "mustang"
                                    "mustang"
                                                               "mustang"
    [94] "mustang"
                                    "mustang"
                                                               "mustang"
```

```
## [97] "mustang"
                                    "mustang"
                                                               "mustang"
                                    "civic"
                                                               "civic"
## [100] "civic"
                                    "civic"
## [103] "civic"
                                                               "civic"
## [106] "civic"
                                                               "civic"
                                    "civic"
## [109] "sonata"
                                    "sonata"
                                                               "sonata"
## [112] "sonata"
                                    "sonata"
                                                               "sonata"
## [115] "sonata"
                                                               "tiburon"
                                    "tiburon"
## [118] "tiburon"
                                                               "tiburon"
                                    "tiburon"
## [121] "tiburon"
                                    "tiburon"
                                                               "grand cherokee 4wd"
## [124] "grand cherokee 4wd"
                                    "grand cherokee 4wd"
                                                               "grand cherokee 4wd"
## [127] "grand cherokee 4wd"
                                    "grand cherokee 4wd"
                                                               "grand cherokee 4wd"
## [130] "grand cherokee 4wd"
                                    "range rover"
                                                               "range rover"
## [133] "range rover"
                                                               "navigator 2wd"
                                    "range rover"
                                                               "mountaineer 4wd"
## [136] "navigator 2wd"
                                    "navigator 2wd"
## [139] "mountaineer 4wd"
                                    "mountaineer 4wd"
                                                               "mountaineer 4wd"
## [142] "altima"
                                    "altima"
                                                               "altima"
## [145] "altima"
                                    "altima"
                                                               "altima"
## [148] "maxima"
                                    "maxima"
                                                               "maxima"
## [151] "pathfinder 4wd"
                                                               "pathfinder 4wd"
                                    "pathfinder 4wd"
## [154] "pathfinder 4wd"
                                    "grand prix"
                                                               "grand prix"
## [157] "grand prix"
                                    "grand prix"
                                                               "grand prix"
## [160] "forester awd"
                                    "forester awd"
                                                               "forester awd"
## [163] "forester awd"
                                    "forester awd"
                                                               "forester awd"
## [166] "impreza awd"
                                                               "impreza awd"
                                    "impreza awd"
## [169] "impreza awd"
                                    "impreza awd"
                                                               "impreza awd"
## [172] "impreza awd"
                                    "impreza awd"
                                                               "4runner 4wd"
## [175] "4runner 4wd"
                                    "4runner 4wd"
                                                               "4runner 4wd"
                                                               "camry"
## [178] "4runner 4wd"
                                    "4runner 4wd"
## [181] "camry"
                                    "camry"
                                                               "camry"
## [184] "camry"
                                    "camry"
                                                               "camry"
## [187] "camry solara"
                                    "camry solara"
                                                               "camry solara"
## [190] "camry solara"
                                    "camry solara"
                                                               "camry solara"
## [193] "camry solara"
                                    "corolla"
                                                               "corolla"
## [196] "corolla"
                                    "corolla"
                                                               "corolla"
## [199] "land cruiser wagon 4wd"
                                    "land cruiser wagon 4wd"
                                                              "toyota tacoma 4wd"
## [202] "toyota tacoma 4wd"
                                    "toyota tacoma 4wd"
                                                               "toyota tacoma 4wd"
## [205] "toyota tacoma 4wd"
                                    "toyota tacoma 4wd"
                                                               "toyota tacoma 4wd"
## [208] "gti"
                                    "gti"
                                                               "gti"
## [211] "gti"
                                    "gti"
                                                               "jetta"
## [214] "jetta"
                                    "jetta"
                                                               "jetta"
## [217] "jetta"
                                    "jetta"
                                                               "jetta"
## [220] "jetta"
                                    "jetta"
                                                               "new beetle"
## [223] "new beetle"
                                    "new beetle"
                                                               "new beetle"
## [226] "new beetle"
                                    "new beetle"
                                                               "passat"
## [229] "passat"
                                    "passat"
                                                               "passat"
## [232] "passat"
                                                               "passat"
                                    "passat"
mpg$displ
##
     [1] 1.8 1.8 2.0 2.0 2.8 2.8 3.1 1.8 1.8 2.0 2.0 2.8 2.8 3.1 3.1 2.8 3.1 4.2
##
    [19] 5.3 5.3 5.3 5.7 6.0 5.7 5.7 6.2 6.2 7.0 5.3 5.3 5.7 6.5 2.4 2.4 3.1 3.5
   [37] 3.6 2.4 3.0 3.3 3.3 3.3 3.3 3.8 3.8 3.8 4.0 3.7 3.7 3.9 3.9 4.7 4.7
##
    [55] 4.7 5.2 5.2 3.9 4.7 4.7 4.7 5.2 5.7 5.9 4.7 4.7 4.7 4.7 4.7 5.2 5.2
   [73] \ 5.7 \ 5.9 \ 4.6 \ 5.4 \ 5.4 \ 4.0 \ 4.0 \ 4.0 \ 4.6 \ 5.0 \ 4.2 \ 4.2 \ 4.6 \ 4.6 \ 4.6 \ 5.4 \ 5.4
##
```

[91] 3.8 3.8 4.0 4.0 4.6 4.6 4.6 4.6 5.4 1.6 1.6 1.6 1.6 1.6 1.8 1.8 1.8 2.0

```
## [109] 2.4 2.4 2.4 2.4 2.5 2.5 3.3 2.0 2.0 2.0 2.0 2.7 2.7 2.7 3.0 3.7 4.0 4.7
## [127] 4.7 4.7 5.7 6.1 4.0 4.2 4.4 4.6 5.4 5.4 5.4 4.0 4.0 4.6 5.0 2.4 2.4 2.5
## [145] 2.5 3.5 3.5 3.0 3.0 3.5 3.3 3.3 4.0 5.6 3.1 3.8 3.8 3.8 5.3 2.5 2.5 2.5
## [181] 2.2 2.4 2.4 3.0 3.0 3.5 2.2 2.2 2.4 2.4 3.0 3.0 3.3 1.8 1.8 1.8 1.8 1.8
## [199] 4.7 5.7 2.7 2.7 2.7 3.4 3.4 4.0 4.0 2.0 2.0 2.0 2.0 2.8 1.9 2.0 2.0 2.0
## [217] 2.0 2.5 2.5 2.8 2.8 1.9 1.9 2.0 2.0 2.5 2.5 1.8 1.8 2.0 2.0 2.8 2.8 3.6
mpg$cyl
    ## [223] 4 4 4 5 5 4 4 4 4 6 6 6
mpg$cty
    [1] 18 21 20 21 16 18 18 18 16 20 19 15 17 17 15 15 17 16 14 11 14 13 12 16 15
   [26] 16 15 15 14 11 11 14 19 22 18 18 17 18 17 16 16 17 17 11 15 15 16 16 15 14
## [51] 13 14 14 14 9 11 11 13 13 9 13 11 13 11 12 9 13 13 12 9 11 11 13 11 11
## [76] 11 12 14 15 14 13 13 13 14 14 13 13 13 11 13 18 18 17 16 15 15 15 15 14 28
## [101] 24 25 23 24 26 25 24 21 18 18 21 21 18 18 19 19 19 20 20 17 16 17 17 15 15
## [126] 14 9 14 13 11 11 12 12 11 11 11 12 14 13 13 13 21 19 23 23 19 19 18 19 19
## [151] 14 15 14 12 18 16 17 18 16 18 18 20 19 20 18 21 19 19 19 20 20 19 20 15 16
## [176] 15 15 16 14 21 21 21 21 18 18 19 21 21 21 22 18 18 18 24 24 26 28 26 11 13
## [201] 15 16 17 15 15 15 16 21 19 21 22 17 33 21 19 22 21 21 21 16 17 35 29 21 19
## [226] 20 20 21 18 19 21 16 18 17
mpg$hwy
    [1] 29 29 31 30 26 26 27 26 25 28 27 25 25 25 25 24 25 23 20 15 20 17 17 26 23
   [26] 26 25 24 19 14 15 17 27 30 26 29 26 24 24 22 22 24 24 17 22 21 23 23 19 18
   [51] 17 17 19 19 12 17 15 17 17 12 17 16 18 15 16 12 17 17 16 12 15 16 17 15 17
## [76] 17 18 17 19 17 19 19 17 17 17 16 16 17 15 17 26 25 26 24 21 22 23 22 20 33
## [101] 32 32 29 32 34 36 36 29 26 27 30 31 26 26 28 26 29 28 27 24 24 24 22 19 20
## [126] 17 12 19 18 14 15 18 18 15 17 16 18 17 19 19 17 29 27 31 32 27 26 26 25 25
## [151] 17 17 20 18 26 26 27 28 25 25 24 27 25 26 23 26 26 26 26 25 27 25 27 20 20
## [176] 19 17 20 17 29 27 31 31 26 26 28 27 29 31 31 26 26 27 30 33 35 37 35 15 18
## [201] 20 20 22 17 19 18 20 29 26 29 29 24 44 29 26 29 29 29 29 29 23 24 44 41 29 26
## [226] 28 29 29 29 28 29 26 26 26
 2. Which manufacturer has the most models in this data set? Which model has the most variations? Show
   your answer.
maxmod <- table(mpg$manufacturer)</pre>
#dodge has most model
maxvarofmod <- table(mpg$model)</pre>
#caravan 2wd has the most Variations
2a. Group the manufacturers and find the unique models. Show your codes and result.
tableofmm <- data.frame(mpg$manufacturer, mpg$model)
```

unofmm <- unique(tableofmm)</pre>

```
ddofun <- data.frame(unofmm[,0],unofmm[,1])</pre>
```

2b. Graph the result by using plot() and ggplot(). Write the codes and its result.