Practical Exam in CS101

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1. Load the mtcars.csv dataset into the R environment. Show your answer.

```
data(mtcars)
head(mtcars)
```

```
##                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

2. How many observations does the mtcars have? How about the number of columns? List down the names of the column. Show your answer.

```
nrow(mtcars)
```

```
## [1] 32
```

```
ncol(mtcars)
```

```
## [1] 11
```

```
colnames(mtcars)
```

```
##  [1] "mpg"  "cyl"  "disp" "hp"   "drat" "wt"   "qsec" "vs"   "am"   "gear"
## [11] "carb"
```

```
library(tibble)
head(mtcars)
```

```
##                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

```
mtcars <- rownames_to_column(mtcars,var = "models")
head(mtcars)
```

```
##              models  mpg cyl disp  hp drat    wt  qsec vs am gear carb
## 1         Mazda RX4 21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## 2     Mazda RX4 Wag 21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## 3        Datsun 710 22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## 4    Hornet 4 Drive 21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
```

```
## 5 Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## 6           Valiant 18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

3. Generate a summary of the numerical variables as well as the structure of each variable in the mtcars dataset. Show your solution

```
summary(mtcars)
```

```
##     models               mpg             cyl             disp
##  Length:32          Min.   :10.40   Min.   :4.000   Min.   : 71.1
##  Class :character   1st Qu.:15.43   1st Qu.:4.000   1st Qu.:120.8
##  Mode  :character   Median :19.20   Median :6.000   Median :196.3
##                     Mean   :20.09   Mean   :6.188   Mean   :230.7
##                     3rd Qu.:22.80   3rd Qu.:8.000   3rd Qu.:326.0
##                     Max.   :33.90   Max.   :8.000   Max.   :472.0
##        hp             drat             wt             qsec
##  Min.   : 52.0   Min.   :2.760   Min.   :1.513   Min.   :14.50
##  1st Qu.: 96.5   1st Qu.:3.080   1st Qu.:2.581   1st Qu.:16.89
##  Median :123.0   Median :3.695   Median :3.325   Median :17.71
##  Mean   :146.7   Mean   :3.597   Mean   :3.217   Mean   :17.85
##  3rd Qu.:180.0   3rd Qu.:3.920   3rd Qu.:3.610   3rd Qu.:18.90
##  Max.   :335.0   Max.   :4.930   Max.   :5.424   Max.   :22.90
##        vs               am              gear            carb
##  Min.   :0.0000   Min.   :0.0000   Min.   :3.000   Min.   :1.000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:3.000   1st Qu.:2.000
##  Median :0.0000   Median :0.0000   Median :4.000   Median :2.000
##  Mean   :0.4375   Mean   :0.4062   Mean   :3.688   Mean   :2.812
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:4.000   3rd Qu.:4.000
##  Max.   :1.0000   Max.   :1.0000   Max.   :5.000   Max.   :8.000
```

```
str(mtcars)
```

```
## 'data.frame':    32 obs. of  12 variables:
##  $ models: chr  "Mazda RX4" "Mazda RX4 Wag" "Datsun 710" "Hornet 4 Drive" ...
##  $ mpg   : num  21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
##  $ cyl   : num  6 6 4 6 8 6 8 4 4 6 ...
##  $ disp  : num  160 160 108 258 360 ...
##  $ hp    : num  110 110 93 110 175 105 245 62 95 123 ...
##  $ drat  : num  3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
##  $ wt    : num  2.62 2.88 2.32 3.21 3.44 ...
##  $ qsec  : num  16.5 17 18.6 19.4 17 ...
##  $ vs    : num  0 0 1 1 0 1 0 1 1 1 ...
##  $ am    : num  1 1 1 0 0 0 0 0 0 0 ...
##  $ gear  : num  4 4 4 3 3 3 3 4 4 4 ...
##  $ carb  : num  4 4 1 1 2 1 4 2 2 4 ...
```

4. Create a bar chart to visualize the distribution of transmission types. Show your solution.

5. Which from the model has the highest mpg? How about the car model with the highest horsepower? Show your solution that will display the name of the model with the highest mpg and the car model with the highest horsepower

```
max_mpg <- mtcars[which.max(mtcars$mpg), ]

max_hp<- mtcars[which.max(mtcars$hp), ]

cat("Car model with the highest mpg:", max_mpg$models, "\n")
```

```
## Car model with the highest mpg: Toyota Corolla
```

```
cat("Car model with the highest horsepower:", max_hp$models, "\n")
```

```
## Car model with the highest horsepower: Maserati Bora
```

6. Which from the car models having 8 cylinders? Save this as newCar.csv file. Display the 1st two rows of this dataset. Show your solution.

```
eightCyl <- mtcars[mtcars$cyl == 8, ]
write.csv(eightCyl, file = "newCar.csv", row.names = FALSE)
head(eightCyl, 2)
```

```
##              models  mpg cyl disp  hp drat   wt  qsec vs am gear carb
## 5 Hornet Sportabout 18.7   8  360 175 3.15 3.44 17.02  0  0    3    2
## 7         Duster 360 14.3   8  360 245 3.21 3.57 15.84  0  0    3    4
```

7. Calculate the mean mpg of the car models with 6 cylinders. Show your solution.

```
meanMpg <- mean(mtcars$mpg[mtcars$cyl == 6])

cat("Mean mpg for car models with 6 cylinders:", meanMpg, "\n")
```

```
## Mean mpg for car models with 6 cylinders: 19.74286
```