hw_02

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Q1 a)

```r
mtcars[mtcars$cyl < 6, ]
```

```
##                 mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Datsun 710     22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
## Merc 240D      24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Merc 230       22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Fiat 128       32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
## Honda Civic    30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
## Toyota Corolla 33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
## Toyota Corona  21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
## Fiat X1-9      27.3   4  79.0  66 4.08 1.935 18.90  1  1    4    1
## Porsche 914-2  26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
## Lotus Europa   30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
## Volvo 142E     21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

Q1 b)

```r
mtcars[-(1:3),]
```

```
##                    mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Hornet 4 Drive    21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Duster 360        14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Merc 240D         24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Merc 230          22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Merc 280          19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
## Merc 280C         17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
## Merc 450SE        16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL        17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC       15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood 10.4  8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4 8 460.0 215 3.00 5.424 17.82  0  0    3    4
## Chrysler Imperial 14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Fiat 128          32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
## Honda Civic       30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
```

```
## Toyota Corolla      33.9    4  71.1   65 4.22 1.835 19.90  1  1    4    1
## Toyota Corona       21.5    4 120.1   97 3.70 2.465 20.01  1  0    3    1
## Dodge Challenger    15.5    8 318.0  150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin         15.2    8 304.0  150 3.15 3.435 17.30  0  0    3    2
## Camaro Z28          13.3    8 350.0  245 3.73 3.840 15.41  0  0    3    4
## Pontiac Firebird    19.2    8 400.0  175 3.08 3.845 17.05  0  0    3    2
## Fiat X1-9           27.3    4  79.0   66 4.08 1.935 18.90  1  1    4    1
## Porsche 914-2       26.0    4 120.3   91 4.43 2.140 16.70  0  1    5    2
## Lotus Europa        30.4    4  95.1  113 3.77 1.513 16.90  1  1    5    2
## Ford Pantera L      15.8    8 351.0  264 4.22 3.170 14.50  0  1    5    4
## Ferrari Dino        19.7    6 145.0  175 3.62 2.770 15.50  0  1    5    6
## Maserati Bora       15.0    8 301.0  335 3.54 3.570 14.60  0  1    5    8
## Volvo 142E          21.4    4 121.0  109 4.11 2.780 18.60  1  1    4    2
```

Q1 c)

```r
mtcars[mtcars$cyl == 8, ]
```

```
##                     mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Hornet Sportabout  18.7    8 360.0 175 3.15 3.440 17.02  0  0    3    2
## Duster 360         14.3    8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Merc 450SE         16.4    8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL         17.3    8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC        15.2    8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood 10.4    8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
## Chrysler Imperial  14.7    8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Dodge Challenger   15.5    8 318.0 150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin        15.2    8 304.0 150 3.15 3.435 17.30  0  0    3    2
## Camaro Z28         13.3    8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Pontiac Firebird   19.2    8 400.0 175 3.08 3.845 17.05  0  0    3    2
## Ford Pantera L     15.8    8 351.0 264 4.22 3.170 14.50  0  1    5    4
## Maserati Bora      15.0    8 301.0 335 3.54 3.570 14.60  0  1    5    8
```

Q1 d)

```r
mtcars[mtcars$cyl == 4 | mtcars$cyl == 6, ]
```

```
##                  mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4       21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag   21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710      22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive  21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Valiant         18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Merc 240D       24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Merc 230        22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Merc 280        19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
## Merc 280C       17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
## Fiat 128        32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
```

```
## Honda Civic     30.4   4  75.7  52 4.93 1.615 18.52  1  1     4     2
## Toyota Corolla 33.9   4  71.1  65 4.22 1.835 19.90  1  1     4     1
## Toyota Corona  21.5   4 120.1  97 3.70 2.465 20.01  1  0     3     1
## Fiat X1-9      27.3   4  79.0  66 4.08 1.935 18.90  1  1     4     1
## Porsche 914-2  26.0   4 120.3  91 4.43 2.140 16.70  0  1     5     2
## Lotus Europa   30.4   4  95.1 113 3.77 1.513 16.90  1  1     5     2
## Ferrari Dino   19.7   6 145.0 175 3.62 2.770 15.50  0  1     5     6
## Volvo 142E     21.4   4 121.0 109 4.11 2.780 18.60  1  1     4     2
```

Q2

When we execute x[NA], it returns five missing values because there are no elements in x that satisfy the condition of being missing.

Q3 mtcars[1:15]

Above line of code returns an error as we are not specifying the row. Syntax should be x[1,1] mtcars[1:5,] is different than mtcars[1:5] as we are specifying both row and column.

Q4

```
x = matrix(c(1:3, NA, 5:7, NA, NA), nrow = 3)
#Here we are creating a matrix of three rows with nultiple values and three of the cells
# contains "NA" as values.
x
```

```
##      [,1] [,2] [,3]
## [1,]    1   NA    7
## [2,]    2    5   NA
## [3,]    3    6   NA
```

```
x[is.na(x)] = 0
# is.na(x) is a logical matrix which looks for a missing values and returns TRUE or FALSE. x[is.na(x)]
# replaces all those NA to "0".
x
```

```
##      [,1] [,2] [,3]
## [1,]    1    0    7
## [2,]    2    5    0
## [3,]    3    6    0
```

Q5

```
#loading the dataframe
data("mtcars")

#checking the dataframe
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
```

```r
#now we need to add another column for the dataframe which has a
#different category of milage for each car model.
#For that we will make use of ifelse function to first to segregate the data into 4 type.

milage_cat <- ifelse(mtcars$mpg < 16.0, "Low",
                 ifelse(mtcars$mpg < 21.0, "Low_intermediate",
                     ifelse(mtcars$mpg < 26.0, "Intermidate_High",  "High" )))

#checking the new column data
head(milage_cat, n=10)
```

```
##  [1] "Intermidate_High" "Intermidate_High" "Intermidate_High" "Intermidate_High"
##  [5] "Low_intermediate" "Low_intermediate" "Low"              "Intermidate_High"
##  [9] "Intermidate_High" "Low_intermediate"
```

```r
#adding the data to dataframe as a new column at the end
mtcars$mpg_2 <- milage_cat

#checking the dataframe to ensure the column  and category makes sense
head(mtcars, n=32)
```

```
##                      mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4           21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag       21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710          22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive      21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout   18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
## Valiant             18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Duster 360          14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Merc 240D           24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Merc 230            22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Merc 280            19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
## Merc 280C           17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
## Merc 450SE          16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL          17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC         15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood  10.4   8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
## Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Fiat 128            32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
## Honda Civic         30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
## Toyota Corolla      33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
## Toyota Corona       21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
## Dodge Challenger    15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin         15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
```

```
## Camaro Z28            13.3    8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Pontiac Firebird      19.2    8 400.0 175 3.08 3.845 17.05  0  0    3    2
## Fiat X1-9             27.3    4  79.0  66 4.08 1.935 18.90  1  1    4    1
## Porsche 914-2         26.0    4 120.3  91 4.43 2.140 16.70  0  1    5    2
## Lotus Europa          30.4    4  95.1 113 3.77 1.513 16.90  1  1    5    2
## Ford Pantera L        15.8    8 351.0 264 4.22 3.170 14.50  0  1    5    4
## Ferrari Dino          19.7    6 145.0 175 3.62 2.770 15.50  0  1    5    6
## Maserati Bora         15.0    8 301.0 335 3.54 3.570 14.60  0  1    5    8
## Volvo 142E            21.4    4 121.0 109 4.11 2.780 18.60  1  1    4    2
##                                   mpg_2
## Mazda RX4             Intermidate_High
## Mazda RX4 Wag         Intermidate_High
## Datsun 710            Intermidate_High
## Hornet 4 Drive        Intermidate_High
## Hornet Sportabout     Low_intermediate
## Valiant               Low_intermediate
## Duster 360                         Low
## Merc 240D             Intermidate_High
## Merc 230              Intermidate_High
## Merc 280              Low_intermediate
## Merc 280C             Low_intermediate
## Merc 450SE            Low_intermediate
## Merc 450SL            Low_intermediate
## Merc 450SLC                        Low
## Cadillac Fleetwood                 Low
## Lincoln Continental                Low
## Chrysler Imperial                  Low
## Fiat 128                          High
## Honda Civic                       High
## Toyota Corolla                    High
## Toyota Corona         Intermidate_High
## Dodge Challenger                   Low
## AMC Javelin                        Low
## Camaro Z28                         Low
## Pontiac Firebird      Low_intermediate
## Fiat X1-9                         High
## Porsche 914-2                     High
## Lotus Europa                      High
## Ford Pantera L                     Low
## Ferrari Dino          Low_intermediate
## Maserati Bora                      Low
## Volvo 142E            Intermidate_High
```