

hw_02

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Q1 a)

```
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)

```
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)

```
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)

```
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 multiple 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
```

*#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"
```

#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
mtcars

```
##           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	Intermediate_High										
## Mazda RX4 Wag	Intermediate_High										
## Datsun 710	Intermediate_High										
## Hornet 4 Drive	Intermediate_High										
## Hornet Sportabout	Low_intermediate										
## Valiant	Low_intermediate										
## Duster 360	Low										
## Merc 240D	Intermediate_High										
## Merc 230	Intermediate_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	Intermediate_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	Intermediate_High										