Nevyn Neal - hw_02

Question 1

```
#Correct sub-setting followed by original question:
mtcars[mtcars$cyl] < 6 #mtcars[mtcars$cyl < 6]
```

```
##                       wt wt.1    hp wt.2    vs wt.3 vs.1  hp.1  hp.2 wt.4 wt.5
## Mazda RX4           TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Mazda RX4 Wag       TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Datsun 710          TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Hornet 4 Drive      TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Hornet Sportabout   TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Valiant             TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Duster 360          TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 240D           TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 230            TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 280            TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 280C           TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 450SE          TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 450SL          TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Merc 450SLC         TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Cadillac Fleetwood  TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Lincoln Continental TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Chrysler Imperial   TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Fiat 128            TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Honda Civic         TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Toyota Corolla      TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Toyota Corona       TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Dodge Challenger    TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## AMC Javelin         TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Camaro Z28          TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Pontiac Firebird    TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Fiat X1-9           TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Porsche 914-2       TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Lotus Europa        TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Ford Pantera L      TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Ferrari Dino        TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Maserati Bora       TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
## Volvo 142E          TRUE TRUE FALSE TRUE  TRUE TRUE TRUE FALSE FALSE TRUE TRUE
##                     vs.2 vs.3 vs.4 vs.5 vs.6 vs.7  hp.3  hp.4  hp.5  hp.6 vs.8
## Mazda RX4           TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Mazda RX4 Wag       TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Datsun 710          TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Hornet 4 Drive      TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Hornet Sportabout   TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
```

```
## Valiant              TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Duster 360           TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 240D            TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 230             TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 280             TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 280C            TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 450SE           TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 450SL           TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Merc 450SLC          TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Cadillac Fleetwood   TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Lincoln Continental  TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Chrysler Imperial    TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Fiat 128             TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Honda Civic          TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Toyota Corolla       TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Toyota Corona        TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Dodge Challenger     TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## AMC Javelin          TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Camaro Z28           TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Pontiac Firebird     TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Fiat X1-9            TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Porsche 914-2        TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Lotus Europa         TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Ford Pantera L       TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Ferrari Dino         TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Maserati Bora        TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
## Volvo 142E           TRUE TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE TRUE
##                      vs.9 vs.10 vs.11  hp.7  hp.8  hp.9 vs.12 wt.6 vs.13 hp.10
## Mazda RX4            TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Mazda RX4 Wag        TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Datsun 710           TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Hornet 4 Drive       TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Hornet Sportabout    TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Valiant              TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Duster 360           TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 240D            TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 230             TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 280             TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 280C            TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 450SE           TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 450SL           TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Merc 450SLC          TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Cadillac Fleetwood   TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Lincoln Continental  TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Chrysler Imperial    TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Fiat 128             TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Honda Civic          TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Toyota Corolla       TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Toyota Corona        TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Dodge Challenger     TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## AMC Javelin          TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Camaro Z28           TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Pontiac Firebird     TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
## Fiat X1-9            TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE TRUE  TRUE FALSE
```

```
## Porsche 914-2      TRUE   TRUE   TRUE FALSE FALSE FALSE   TRUE TRUE   TRUE FALSE
## Lotus Europa       TRUE   TRUE   TRUE FALSE FALSE FALSE   TRUE TRUE   TRUE FALSE
## Ford Pantera L     TRUE   TRUE   TRUE FALSE FALSE FALSE   TRUE TRUE   TRUE FALSE
## Ferrari Dino       TRUE   TRUE   TRUE FALSE FALSE FALSE   TRUE TRUE   TRUE FALSE
## Maserati Bora      TRUE   TRUE   TRUE FALSE FALSE FALSE   TRUE TRUE   TRUE FALSE
## Volvo 142E         TRUE   TRUE   TRUE FALSE FALSE FALSE   TRUE TRUE   TRUE FALSE
```

```r
rbind(mtcars[-1:0,],mtcars[0:3,]) #mtcars[-1:3,]
```

```
##                     mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## 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
## Mazda RX4          21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag1     21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
## Datsun 7101        22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
```

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

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

Question 2

Since NA is a logical type variable, x[NA] coerces the integers of x to their NA_integer value, NA.

Question 3

R subsetting defaults to indexing columns when row or columns are not specified (using commas). Because mtcars does not have 15 columns, the index is out of bounds. 'mtcars[1:15,]' indexes rows instead of columns, and since there are at least 15 rows in the mtcars dataframe, those are returned successfully.

Question 4

The first line creates a 3 row matrix with 9 values (implicitly defines 3 columns). Some of the values in the initial matrix are NA. The next line returns the indicies of x in which is.na(x) == true, then replaces the values at those locations with 0.

Question 5

```
data("mtcars")
mtcars$mpg2 = 'null'
mtcars$mpg2[mtcars$mpg < 16] = 'Low'
mtcars$mpg2[mtcars$mpg >= 16 & mtcars$mpg < 21 ] = 'Low_intermediate'
mtcars$mpg2[mtcars$mpg >= 21 & mtcars$mpg < 26 ] = 'Intermediate_high'
mtcars$mpg2[mtcars$mpg >= 26] = 'Low_intermediate'
```