R Lists

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```
# let's create a vector, a matrix and a dataframe
v \leftarrow c(1,2,3)
m <- matrix(1:10, nrow = 2)</pre>
df <- mtcars
class(v)
## [1] "numeric"
class(m)
## [1] "matrix" "array"
class(df)
## [1] "data.frame"
# create a list with all the above
my.list <- list(v, m, df)</pre>
my.list
## [[1]]
## [1] 1 2 3
##
## [[2]]
        [,1] [,2] [,3] [,4] [,5]
## [1,]
           1
                3
                     5
                          7
## [2,]
           2
                4
                     6
                          8
                             10
## [[3]]
##
                        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
## Mazda RX4 Wag
                       21.0
                              6 160.0 110 3.90 2.875 17.02 0
## Datsun 710
                       22.8
                             4 108.0 93 3.85 2.320 18.61 1 1
                                                                          1
## Hornet 4 Drive
                       21.4
                              6 258.0 110 3.08 3.215 19.44 1 0
                       18.7 8 360.0 175 3.15 3.440 17.02 0 0
                                                                          2
## Hornet Sportabout
```

```
8 360.0 245 3.21 3.570 15.84
                                                                       3
                                                                            4
## Duster 360
                        14.3
                                                              0
                                                                 0
                                                                            2
## Merc 240D
                       24.4
                               4 146.7 62 3.69 3.190 20.00
                       22.8
## Merc 230
                               4 140.8
                                       95 3.92 3.150 22.90
                                                                            2
## Merc 280
                        19.2
                               6 167.6 123 3.92 3.440 18.30
                                                                       4
                                                                            4
                               6 167.6 123 3.92 3.440 18.90
                                                                       4
                                                                            4
## Merc 280C
                       17.8
                                                                 Ω
## Merc 450SE
                       16.4
                               8 275.8 180 3.07 4.070 17.40
## 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
                                                                 Λ
                                                                       3
                                                                            3
                                                                       3
## Cadillac Fleetwood 10.4
                               8 472.0 205 2.93 5.250 17.98
                                                                 0
                                                                            4
## Lincoln Continental 10.4
                               8 460.0 215 3.00 5.424 17.82
                                                                            4
                               8 440.0 230 3.23 5.345 17.42
                                                                       3
## Chrysler Imperial
                        14.7
                                                                 0
                                                                            4
## Fiat 128
                        32.4
                                  78.7
                                        66 4.08 2.200 19.47
                                                                       4
                                                                            1
                                                                 1
                                        52 4.93 1.615 18.52
                                                                            2
## Honda Civic
                        30.4
                                  75.7
## Toyota Corolla
                        33.9
                               4 71.1
                                        65 4.22 1.835 19.90
                                                                       4
                                                              1
                                                                 1
                                                                            1
## Toyota Corona
                        21.5
                               4 120.1
                                        97 3.70 2.465 20.01
                                                                 0
                                                                       3
                                                                            1
                                                                       3
                                                                            2
## Dodge Challenger
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                              0
                                                                 0
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                               8 350.0 245 3.73 3.840 15.41
## Camaro Z28
                       13.3
                                                              0
                                                                 0
                                                                      3
                                                                            4
## Pontiac Firebird
                        19.2
                               8 400.0 175 3.08 3.845 17.05
                                                                 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
                       30.4
                               4 95.1 113 3.77 1.513 16.90
                                                                            2
## Lotus Europa
                                                                      5
                                                              1
                                                                 1
                               8 351.0 264 4.22 3.170 14.50
                                                              0
                                                                      5
## Ford Pantera L
                       15.8
                                                                            4
                                                                       5
                                                                            6
## Ferrari Dino
                        19.7
                               6 145.0 175 3.62 2.770 15.50
                                                                 1
## Maserati Bora
                       15.0
                               8 301.0 335 3.54 3.570 14.60
                                                                       5
                                                                            8
## Volvo 142E
                       21.4
                               4 121.0 109 4.11 2.780 18.60
                                                                            2
                                                              1
# assign names to headers
my.named.list <- list(sample_vec = v, my.matrix = m, sample.df = df)
my.named.list
## $sample_vec
## [1] 1 2 3
##
## $my.matrix
        [,1] [,2] [,3] [,4] [,5]
##
## [1,]
           1
                3
                     5
                           7
           2
                     6
                           8
                               10
##
  [2,]
                4
##
## $sample.df
##
                        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
## Mazda RX4 Wag
                        21.0
                               6 160.0 110 3.90 2.875 17.02
                                                                       4
                                                                            4
                                                              0
                                                                 1
## Datsun 710
                       22.8
                               4 108.0 93 3.85 2.320 18.61
## Hornet 4 Drive
                        21.4
                               6 258.0 110 3.08 3.215 19.44
                                                                            1
                        18.7
                               8 360.0 175 3.15 3.440 17.02
                                                                 0
                                                                       3
                                                                            2
## Hornet Sportabout
                                                                       3
                        18.1
                               6 225.0 105 2.76 3.460 20.22
                                                                 0
                                                                            1
## Valiant
                                                              1
## Duster 360
                               8 360.0 245 3.21 3.570 15.84
                        14.3
## Merc 240D
                       24.4
                               4 146.7 62 3.69 3.190 20.00
                                                              1
                                                                 Ω
                                                                       4
                                                                            2
## Merc 230
                       22.8
                               4 140.8 95 3.92 3.150 22.90
                                                                 0
                                                                       4
                                                                            2
## Merc 280
                       19.2
                               6 167.6 123 3.92 3.440 18.30
                                                              1
                                                                 Ω
                                                                      4
                                                                            4
                       17.8
                               6 167.6 123 3.92 3.440 18.90
## Merc 280C
                               8 275.8 180 3.07 4.070 17.40 0
## Merc 450SE
                       16.4
                                                                            3
```

6 225.0 105 2.76 3.460 20.22

Valiant

18.1

```
## Merc 450SL
                        17.3
                               8 275.8 180 3.07 3.730 17.60
## Merc 450SLC
                        15.2
                               8 275.8 180 3.07 3.780 18.00
                                                                       3
                                                                             3
                                                               0
                                                                  0
## Cadillac Fleetwood
                        10.4
                               8 472.0 205 2.93 5.250 17.98
                                                                        3
                                                                             4
## Lincoln Continental 10.4
                               8 460.0 215 3.00 5.424 17.82
                                                                       3
                                                                             4
## Chrysler Imperial
                        14.7
                               8 440.0 230 3.23 5.345 17.42
                                                                        3
                                                                             4
                                         66 4.08 2.200 19.47
                                                                        4
## Fiat 128
                        32.4
                                  78.7
                                                                             1
                                                                  1
## Honda Civic
                        30.4
                                  75.7
                                         52 4.93 1.615 18.52
## 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
                                                                        3
                                                                             2
## Dodge Challenger
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                                  \cap
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                                                                        3
                                                                             2
                               8 350.0 245 3.73 3.840 15.41
                                                                        3
## Camaro Z28
                        13.3
                                                                  0
                                                                             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
                                                                        4
                        26.0
                               4 120.3 91 4.43 2.140 16.70
                                                                       5
                                                                             2
## Porsche 914-2
                                                               0
                                                                  1
## Lotus Europa
                        30.4
                               4 95.1 113 3.77 1.513 16.90
                                                               1
                                                                       5
                                                                             2
                        15.8
                               8 351.0 264 4.22 3.170 14.50
                                                               0
                                                                       5
## Ford Pantera L
                                                                  1
                                                                             4
## Ferrari Dino
                        19.7
                               6 145.0 175 3.62 2.770 15.50
                                                                       5
                                                                             6
                               8 301.0 335 3.54 3.570 14.60
## Maserati Bora
                        15.0
                                                               0
                                                                       5
                                                                             8
## Volvo 142E
                        21.4
                               4 121.0 109 4.11 2.780 18.60
                                                                        4
                                                                             2
```

call elements form the list

my.named.list\$sample.df

```
##
                         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
## Mazda RX4 Wag
                        21.0
                               6 160.0 110 3.90 2.875 17.02
                                                               0
                                                                       4
                                                                            4
## Datsun 710
                        22.8
                               4 108.0 93 3.85 2.320 18.61
                                                                       4
                                                                       3
## Hornet 4 Drive
                        21.4
                               6 258.0 110 3.08 3.215 19.44
                                                               1
                                                                  0
                                                                            1
## Hornet Sportabout
                        18.7
                               8 360.0 175 3.15 3.440 17.02
                                                                       3
## Valiant
                        18.1
                               6 225.0 105 2.76 3.460 20.22
                                                                       3
                                                               1
                                                                  0
                                                                            1
## Duster 360
                        14.3
                               8 360.0 245 3.21 3.570 15.84
                                                                       3
                                                                            4
## Merc 240D
                        24.4
                               4 146.7 62 3.69 3.190 20.00
                                                                  \cap
                                                                       Δ
                                                                            2
                                                               1
                        22.8
                               4 140.8 95 3.92 3.150 22.90
## Merc 230
## Merc 280
                               6 167.6 123 3.92 3.440 18.30
                                                                       4
                        19.2
                                                               1
                                                                  0
                                                                            4
## Merc 280C
                        17.8
                               6 167.6 123 3.92 3.440 18.90
                                                                       4
                                                                            4
                                                                       3
## Merc 450SE
                        16.4
                               8 275.8 180 3.07 4.070 17.40
                                                                  0
                                                                            3
## Merc 450SL
                        17.3
                               8 275.8 180 3.07 3.730 17.60
                                                                            3
                        15.2
                               8 275.8 180 3.07 3.780 18.00
                                                                       3
## Merc 450SLC
                                                                  0
                                                                            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
                                                                       3
                                                                            4
## Chrysler Imperial
                               8 440.0 230 3.23 5.345 17.42
                                                                  0
                                                                       3
                        14.7
                                  78.7
                                        66 4.08 2.200 19.47
## Fiat 128
                        32.4
                               4
                                                                  1
                                                                       4
                                                                            1
## Honda Civic
                        30.4
                               4
                                  75.7
                                        52 4.93 1.615 18.52
                                                               1
                                                                       4
                                                                            2
                                                                  1
## Toyota Corolla
                        33.9
                               4 71.1
                                        65 4.22 1.835 19.90
                                        97 3.70 2.465 20.01
                                                                       3
## Toyota Corona
                        21.5
                               4 120.1
                                                                            1
## Dodge Challenger
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                                  0
                                                                       3
                                                                            2
                                                                       3
                                                                            2
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                                                               0
                                                                  0
## Camaro Z28
                               8 350.0 245 3.73 3.840 15.41
                                                                       3
                        13.3
## Pontiac Firebird
                        19.2
                               8 400.0 175 3.08 3.845 17.05
                                                               0
                                                                  Ω
                                                                       3
                                                                            2
## Fiat X1-9
                        27.3
                               4 79.0
                                       66 4.08 1.935 18.90
                                                                       4
                                                               1
                                                                            1
## Porsche 914-2
                        26.0
                               4 120.3 91 4.43 2.140 16.70
                                                                  1
                                                                       5
                                                                            2
                        30.4
                                                                            2
## Lotus Europa
                               4 95.1 113 3.77 1.513 16.90
                               8 351.0 264 4.22 3.170 14.50
## Ford Pantera L
                        15.8
                                                                            4
```

```
19.7 6 145.0 175 3.62 2.770 15.50 0 1
                                                                       6
## Ferrari Dino
                      15.0 8 301.0 335 3.54 3.570 14.60 0 1
                                                                       8
## Maserati Bora
                                                                  5
## Volvo 142E
                     21.4 4 121.0 109 4.11 2.780 18.60 1 1
my.named.list[1] # call first elemeent
## $sample_vec
## [1] 1 2 3
my.named.list['sample_vec']
## $sample_vec
## [1] 1 2 3
# what data type is this?
class(my.named.list['sample_vec']) # "list"
## [1] "list"
class(my.named.list$sample_vec) # "numeric"
## [1] "numeric"
class(my.named.list$sample.df) # "data.frame"
## [1] "data.frame"
# grab the actual values
my.named.list[['sample_vec']]
## [1] 1 2 3
class(my.named.list[['sample_vec']]) # "numeric"
## [1] "numeric"
# make a list of a list
double.list <- c(my.named.list, my.named.list)</pre>
double.list
## $sample_vec
## [1] 1 2 3
##
## $my.matrix
       [,1] [,2] [,3] [,4] [,5]
## [1,]
         1 3 5 7
## [2,]
                           10
##
```

```
## $sample.df
##
                        mpg cyl disp hp drat
                                                    wt qsec vs am gear carb
                               6 160.0 110 3.90 2.620 16.46
## Mazda RX4
                        21.0
## Mazda RX4 Wag
                                                                            4
                        21.0
                               6 160.0 110 3.90 2.875 17.02
## Datsun 710
                        22.8
                               4 108.0 93 3.85 2.320 18.61
                                                                       4
                                                                            1
                                                                       3
## Hornet 4 Drive
                        21.4
                               6 258.0 110 3.08 3.215 19.44
                                                                  0
                                                                            1
## Hornet Sportabout
                        18.7
                               8 360.0 175 3.15 3.440 17.02
## Valiant
                                                                       3
                        18.1
                               6 225.0 105 2.76 3.460 20.22
                                                               1
                                                                  0
                                                                            1
## Duster 360
                        14.3
                               8 360.0 245 3.21 3.570 15.84
                                                               0
                                                                  Ω
                                                                       3
                                                                            4
                                                                       4
                                                                            2
## Merc 240D
                        24.4
                               4 146.7 62 3.69 3.190 20.00
                                                               1
                                                                  0
## Merc 230
                        22.8
                               4 140.8 95 3.92 3.150 22.90
                                                                            2
                               6 167.6 123 3.92 3.440 18.30
                                                                       4
## Merc 280
                        19.2
                                                               1
                                                                  0
                                                                            4
## Merc 280C
                        17.8
                               6 167.6 123 3.92 3.440 18.90
                                                               1
                                                                  0
                                                                       4
                                                                            4
## Merc 450SE
                               8 275.8 180 3.07 4.070 17.40
                                                                       3
                        16.4
                                                                  0
                                                                            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
                                                               0
                                                                       3
## Cadillac Fleetwood 10.4
                               8 472.0 205 2.93 5.250 17.98
                                                                  0
                                                                            4
## Lincoln Continental 10.4
                               8 460.0 215 3.00 5.424 17.82
                                                                       3
                               8 440.0 230 3.23 5.345 17.42
                                                                       3
## Chrysler Imperial
                        14.7
                                                               0
                                                                  0
                                                                            4
## Fiat 128
                        32.4
                                  78.7
                                        66 4.08 2.200 19.47
                                                                       4
                                                                            1
## Honda Civic
                        30.4
                               4 75.7
                                        52 4.93 1.615 18.52
                                                                  1
                                                                       4
                                                                            2
## Toyota Corolla
                        33.9
                                        65 4.22 1.835 19.90
                               4 71.1
                                       97 3.70 2.465 20.01
                               4 120.1
                                                                       3
## Toyota Corona
                        21.5
                                                                  Ω
                                                               1
                                                                            1
                                                                       3
                                                                            2
## Dodge Challenger
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                                       3
                                                                            2
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                                                                  0
## Camaro Z28
                        13.3
                               8 350.0 245 3.73 3.840 15.41
                                                                            4
## Pontiac Firebird
                        19.2
                               8 400.0 175 3.08 3.845 17.05
                                                               0
                                                                  0
                                                                       3
                                                                            2
                        27.3
## Fiat X1-9
                               4 79.0 66 4.08 1.935 18.90
                                                               1
                                                                       4
                                                                            1
                                                                       5
                                                                            2
                        26.0
                               4 120.3 91 4.43 2.140 16.70
## Porsche 914-2
                                                                  1
## Lotus Europa
                        30.4
                               4 95.1 113 3.77 1.513 16.90
                                                                       5
                                                                            2
                                                               1
## 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
                                                                       5
                                                                            8
                               4 121.0 109 4.11 2.780 18.60
                                                                            2
## Volvo 142E
                        21.4
                                                               1
## $sample vec
## [1] 1 2 3
##
## $my.matrix
##
        [,1] [,2] [,3] [,4] [,5]
## [1,]
           1
                3
                      5
                           7
##
   [2,]
           2
                4
                      6
                           8
                               10
##
## $sample.df
                         mpg cyl disp hp drat
                                                    wt qsec vs am gear carb
                        21.0
                               6 160.0 110 3.90 2.620 16.46
## Mazda RX4
                                                               0
                                                                  1
                                                                       4
## Mazda RX4 Wag
                        21.0
                               6 160.0 110 3.90 2.875 17.02
                                                               0
                                                                  1
                                                                       4
                                                                            4
                                                                            1
## Datsun 710
                        22.8
                               4 108.0 93 3.85 2.320 18.61
## Hornet 4 Drive
                        21.4
                               6 258.0 110 3.08 3.215 19.44
                                                               1
                                                                            1
                                                                            2
## Hornet Sportabout
                        18.7
                               8 360.0 175 3.15 3.440 17.02
                                                               0
                                                                  0
                                                                       3
                        18.1
                                                                       3
## Valiant
                               6 225.0 105 2.76 3.460 20.22
                                                               1
                                                                  0
                                                                            1
                                                                       3
## Duster 360
                        14.3
                               8 360.0 245 3.21 3.570 15.84
                                                                  0
                                                                            4
## Merc 240D
                        24.4
                               4 146.7 62 3.69 3.190 20.00
                                                                  0
                                                                       4
                                                                            2
                                                               1
## Merc 230
                        22.8
                               4 140.8 95 3.92 3.150 22.90
                                                                       4
```

```
6 167.6 123 3.92 3.440 18.30 1 0
## Merc 280
                     19.2
## Merc 280C
                     17.8
                            6 167.6 123 3.92 3.440 18.90 1
                                                                    4
                           8 275.8 180 3.07 4.070 17.40 0
## Merc 450SE
                     16.4
## Merc 450SL
                           8 275.8 180 3.07 3.730 17.60 0 0
                     17.3
                                                                    3
## Merc 450SLC
                     15.2
                           8 275.8 180 3.07 3.780 18.00 0
                                                                    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
## Chrysler Imperial 14.7
                           8 440.0 230 3.23 5.345 17.42 0 0
                                                               3
## Fiat 128
                     32.4
                          4 78.7 66 4.08 2.200 19.47 1
                                                          1
                                                                    1
## Honda Civic
                     30.4
                          4 75.7 52 4.93 1.615 18.52 1 1
## Toyota Corolla
                     33.9
                           4 71.1 65 4.22 1.835 19.90 1 1
                                                                    1
                          4 120.1 97 3.70 2.465 20.01 1
## Toyota Corona
                     21.5
                                                          0
                                                               3
                                                                    1
                          8 318.0 150 2.76 3.520 16.87 0
                                                                    2
## Dodge Challenger
                     15.5
                                                          0
                                                               3
## AMC Javelin
                          8 304.0 150 3.15 3.435 17.30 0
                                                               3
                     15.2
                                                          Ω
## Camaro Z28
                     13.3
                           8 350.0 245 3.73 3.840 15.41 0 0
## Pontiac Firebird
                     19.2
                           8 400.0 175 3.08 3.845 17.05 0 0
                                                               3
## Fiat X1-9
                     27.3
                           4 79.0 66 4.08 1.935 18.90 1 1
                                                              4
                                                                    1
                          4 120.3 91 4.43 2.140 16.70 0 1
## Porsche 914-2
                     26.0
## Lotus Europa
                     30.4 4 95.1 113 3.77 1.513 16.90 1 1
                                                             5
                                                                    2
                     15.8 8 351.0 264 4.22 3.170 14.50 0 1
## Ford Pantera L
                                                              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
## Volvo 142E
                     21.4 4 121.0 109 4.11 2.780 18.60 1 1
```

getting information on the list

str(my.named.list)

```
## List of 3
   $ sample_vec: num [1:3] 1 2 3
## $ my.matrix : int [1:2, 1:5] 1 2 3 4 5 6 7 8 9 10
   $ sample.df :'data.frame': 32 obs. of 11 variables:
     ..$ mpg : num [1:32] 21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
##
     ..$ cyl : num [1:32] 6 6 4 6 8 6 8 4 4 6 ...
     ..$ disp: num [1:32] 160 160 108 258 360 ...
     ..$ hp : num [1:32] 110 110 93 110 175 105 245 62 95 123 ...
##
##
     ..$ drat: num [1:32] 3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
##
     ..$ wt : num [1:32] 2.62 2.88 2.32 3.21 3.44 ...
##
     ..$ qsec: num [1:32] 16.5 17 18.6 19.4 17 ...
##
     ..$ vs : num [1:32] 0 0 1 1 0 1 0 1 1 1 ...
##
     ..$ am : num [1:32] 1 1 1 0 0 0 0 0 0 0 ...
##
     ..$ gear: num [1:32] 4 4 4 3 3 3 3 4 4 4 ...
##
     ..$ carb: num [1:32] 4 4 1 1 2 1 4 2 2 4 ...
```