```
> typeof(6)
[1] "double"
> typeof(6L)
[1] "integer"
> Don't'
Error: unexpected string constant in "Don't'"
> "Don't"
[1] "Don't"
> typeof("Don't")
[1] "character"
> typeof(make)
Error: object 'make' not found
> typeof("make")
[1] "character"
> typeof("TRUE")
[1] "character"
> typeof(TRUE)
[1] "logical"
> typeof(T)
[1] "logical"
> TRUE=T
Error in TRUE = T : invalid (do_set) left-hand side to assignment
> TRUE==T
[1] TRUE
> typeof(FALSE)
[1] "logical"
> typeof(F)
[1] "logical"
> F==T
[1] FALSE
> 3+3i
[1] 3+3i
> typeof(3+3i)
[1] "complex"
> TRUE==1
[1] TRUE
> TRUE=0
Error in TRUE = 0 : invalid (do_set) left-hand side to assignment
> TRUE==0
[1] FALSE
> typeof(6L)
[1] "integer"
> typeof(7.897)
[1] "double"
> typeof(6)
[1] "double"
> typeof(as.integer(6))
[1] "integer"
> typeof(as.character(6))
```

```
[1] "character"
> typeof("6")
[1] "character"


> typeof(6)
[1] "double"
> typeof(6L)
[1] "integer"
> typeof(TRUE)
[1] "logical"
> typeof(T)
[1] "logical"
> typeof("Cat")
[1] "character"
> typeof(3i+5)
[1] "complex"
> typeof(3,4,10)
Error in typeof(3, 4, 10) : unused arguments (4, 10)
> typeof(c(3, 4, 10))
[1] "double"
> typeof(c(3L, 4L, 10L))
[1] "integer"
> typeof(c(3L, "male", 10L))
[1] "character"
> (c(3L, "male", 10L))
[1] "3"    "male" "10"
> "male"
[1] "male"
>
> mode(c(3L, 4, 10L))
[1] "numeric"
> x=10
> y=34
> z=12
> x <- 10
> y <- 34
> z <- 12
> x + y
[1] 44
> x - y
[1] -24
> x / z
[1] 0.8333333
> x <- c(23, 26, 19, 30)
> print(x)
[1] 23 26 19 30
> age <- x
> rm(x)
```

```
> age
[1] 23 26 19 30
> x <- 1:100
> x
  [1]   1   2   3   4   5   6   7   8   9  10
 [11]  11  12  13  14  15  16  17  18  19  20
 [21]  21  22  23  24  25  26  27  28  29  30
 [31]  31  32  33  34  35  36  37  38  39  40
 [41]  41  42  43  44  45  46  47  48  49  50
 [51]  51  52  53  54  55  56  57  58  59  60
 [61]  61  62  63  64  65  66  67  68  69  70
 [71]  71  72  73  74  75  76  77  78  79  80
 [81]  81  82  83  84  85  86  87  88  89  90
 [91]  91  92  93  94  95  96  97  98  99 100
> x[3]
[1] 3
> x
  [1]   1   2   3   4   5   6   7   8   9  10
 [11]  11  12  13  14  15  16  17  18  19  20
 [21]  21  22  23  24  25  26  27  28  29  30
 [31]  31  32  33  34  35  36  37  38  39  40
 [41]  41  42  43  44  45  46  47  48  49  50
 [51]  51  52  53  54  55  56  57  58  59  60
 [61]  61  62  63  64  65  66  67  68  69  70
 [71]  71  72  73  74  75  76  77  78  79  80
 [81]  81  82  83  84  85  86  87  88  89  90
 [91]  91  92  93  94  95  96  97  98  99 100
> y
[1] 34
> y <- 100:1
> y
  [1] 100  99  98  97  96  95  94  93  92  91
 [11]  90  89  88  87  86  85  84  83  82  81
 [21]  80  79  78  77  76  75  74  73  72  71
 [31]  70  69  68  67  66  65  64  63  62  61
 [41]  60  59  58  57  56  55  54  53  52  51
 [51]  50  49  48  47  46  45  44  43  42  41
 [61]  40  39  38  37  36  35  34  33  32  31
 [71]  30  29  28  27  26  25  24  23  22  21
 [81]  20  19  18  17  16  15  14  13  12  11
 [91]  10   9   8   7   6   5   4   3   2   1
> y[97]
[1] 4
> y[77]
[1] 24
> y[63]
[1] 38
> y[c(1,2,3)]
[1] 100  99  98
```

```
> z <- 10:1
> z
 [1] 10  9  8  7  6  5  4  3  2  1
> matrix(c(1,2,3,4,5,6), ncol = 3, nrow = 2)
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6
> mat1 <- matrix(c(1,2,3,4,5,6), ncol = 3, nrow = 2)
> mat1
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6
> mat2
Error: object 'mat2' not found
> mat2 <- matrix(c(1,2,3,4,5,6), ncol = 2, nrow = 3)
> mat2
     [,1] [,2]
[1,]    1    4
[2,]    2    5
[3,]    3    6
> mat1 %*% mat1
Error in mat1 %*% mat1 : non-conformable arguments
> mat2 %*% mat1
     [,1] [,2] [,3]
[1,]    9   19   29
[2,]   12   26   40
[3,]   15   33   51
> x1 <- c("apple", "nokia", "samsung", "xiomi")
> x1
[1] "apple"   "nokia"   "samsung" "xiomi"
> "vivo" %in% x1
[1] FALSE
> x <- c(T, T)
> y <- c(T, F)
> x | y
[1] TRUE TRUE
> x & y
[1]  TRUE FALSE
> x <- c(1,2,3,4)
> sum(x)
[1] 10
> mean(x)
[1] 2.5
> mean(x)
[1] 2.5
> summary(x)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   1.00    1.75    2.50    2.50    3.25    4.00
> min(x)
```

```
[1] 1
> lm()
Error in terms.formula(formula, data = data) :
  argument is not a valid model
> lm(mtcars)

Call:
lm(formula = mtcars)

Coefficients:
(Intercept)          cyl         disp
   12.30337     -0.11144      0.01334
         hp         drat           wt
   -0.02148      0.78711     -3.71530
       qsec           vs           am
    0.82104      0.31776      2.52023
       gear         carb
    0.65541     -0.19942

> mtcars
                   mpg cyl  disp  hp drat
Mazda RX4         21.0   6 160.0 110 3.90
Mazda RX4 Wag     21.0   6 160.0 110 3.90
Datsun 710        22.8   4 108.0  93 3.85
Hornet 4 Drive    21.4   6 258.0 110 3.08
Hornet Sportabout 18.7   8 360.0 175 3.15
Valiant           18.1   6 225.0 105 2.76
Duster 360        14.3   8 360.0 245 3.21
Merc 240D         24.4   4 146.7  62 3.69
Merc 230          22.8   4 140.8  95 3.92
Merc 280          19.2   6 167.6 123 3.92
Merc 280C         17.8   6 167.6 123 3.92
Merc 450SE        16.4   8 275.8 180 3.07
Merc 450SL        17.3   8 275.8 180 3.07
Merc 450SLC       15.2   8 275.8 180 3.07
Cadillac Fleetwood  10.4   8 472.0 205 2.93
Lincoln Continental 10.4   8 460.0 215 3.00
Chrysler Imperial   14.7   8 440.0 230 3.23
Fiat 128          32.4   4  78.7  66 4.08
Honda Civic       30.4   4  75.7  52 4.93
Toyota Corolla    33.9   4  71.1  65 4.22
Toyota Corona     21.5   4 120.1  97 3.70
Dodge Challenger  15.5   8 318.0 150 2.76
AMC Javelin       15.2   8 304.0 150 3.15
Camaro Z28        13.3   8 350.0 245 3.73
Pontiac Firebird  19.2   8 400.0 175 3.08
Fiat X1-9         27.3   4  79.0  66 4.08
Porsche 914-2     26.0   4 120.3  91 4.43
Lotus Europa      30.4   4  95.1 113 3.77
```

```
Ford Pantera L      15.8   8 351.0 264 4.22
Ferrari Dino        19.7   6 145.0 175 3.62
Maserati Bora       15.0   8 301.0 335 3.54
Volvo 142E          21.4   4 121.0 109 4.11
                      wt  qsec vs am gear carb
Mazda RX4           2.620 16.46  0  1    4    4
Mazda RX4 Wag       2.875 17.02  0  1    4    4
Datsun 710          2.320 18.61  1  1    4    1
Hornet 4 Drive      3.215 19.44  1  0    3    1
Hornet Sportabout   3.440 17.02  0  0    3    2
Valiant             3.460 20.22  1  0    3    1
Duster 360          3.570 15.84  0  0    3    4
Merc 240D           3.190 20.00  1  0    4    2
Merc 230            3.150 22.90  1  0    4    2
Merc 280            3.440 18.30  1  0    4    4
Merc 280C           3.440 18.90  1  0    4    4
Merc 450SE          4.070 17.40  0  0    3    3
Merc 450SL          3.730 17.60  0  0    3    3
Merc 450SLC         3.780 18.00  0  0    3    3
Cadillac Fleetwood  5.250 17.98  0  0    3    4
Lincoln Continental 5.424 17.82  0  0    3    4
Chrysler Imperial   5.345 17.42  0  0    3    4
Fiat 128            2.200 19.47  1  1    4    1
Honda Civic         1.615 18.52  1  1    4    2
Toyota Corolla      1.835 19.90  1  1    4    1
Toyota Corona       2.465 20.01  1  0    3    1
Dodge Challenger    3.520 16.87  0  0    3    2
AMC Javelin         3.435 17.30  0  0    3    2
Camaro Z28          3.840 15.41  0  0    3    4
Pontiac Firebird    3.845 17.05  0  0    3    2
Fiat X1-9           1.935 18.90  1  1    4    1
Porsche 914-2       2.140 16.70  0  1    5    2
Lotus Europa        1.513 16.90  1  1    5    2
Ford Pantera L      3.170 14.50  0  1    5    4
Ferrari Dino        2.770 15.50  0  1    5    6
Maserati Bora       3.570 14.60  0  1    5    8
Volvo 142E          2.780 18.60  1  1    4    2
> lm(mtcars)

Call:
lm(formula = mtcars)

Coefficients:
(Intercept)          cyl         disp
   12.30337     -0.11144      0.01334
         hp         drat           wt
   -0.02148      0.78711     -3.71530
       qsec           vs           am
    0.82104      0.31776      2.52023
```

```
      gear         carb
   0.65541     -0.19942

> summery(mtcars)
Error in summery(mtcars) : could not find function "summery"
> summary(mtcars)
      mpg             cyl
 Min.   :10.40   Min.   :4.000
 1st Qu.:15.43   1st Qu.:4.000
 Median :19.20   Median :6.000
 Mean   :20.09   Mean   :6.188
 3rd Qu.:22.80   3rd Qu.:8.000
 Max.   :33.90   Max.   :8.000
      disp             hp
 Min.   : 71.1   Min.   : 52.0
 1st Qu.:120.8   1st Qu.: 96.5
 Median :196.3   Median :123.0
 Mean   :230.7   Mean   :146.7
 3rd Qu.:326.0   3rd Qu.:180.0
 Max.   :472.0   Max.   :335.0
      drat             wt
 Min.   :2.760   Min.   :1.513
 1st Qu.:3.080   1st Qu.:2.581
 Median :3.695   Median :3.325
 Mean   :3.597   Mean   :3.217
 3rd Qu.:3.920   3rd Qu.:3.610
 Max.   :4.930   Max.   :5.424
      qsec             vs
 Min.   :14.50   Min.   :0.0000
 1st Qu.:16.89   1st Qu.:0.0000
 Median :17.71   Median :0.0000
 Mean   :17.85   Mean   :0.4375
 3rd Qu.:18.90   3rd Qu.:1.0000
 Max.   :22.90   Max.   :1.0000
       am              gear
 Min.   :0.0000   Min.   :3.000
 1st Qu.:0.0000   1st Qu.:3.000
 Median :0.0000   Median :4.000
 Mean   :0.4062   Mean   :3.688
 3rd Qu.:1.0000   3rd Qu.:4.000
 Max.   :1.0000   Max.   :5.000
      carb
 Min.   :1.000
 1st Qu.:2.000
 Median :2.000
 Mean   :2.812
 3rd Qu.:4.000
 Max.   :8.000
> x <- c(23, 26, NA, 19, 30)
```

```
> is.na(x)
[1] FALSE FALSE  TRUE FALSE FALSE
> which(is.na(x))
[1] 3
> any(is.na(x))
[1] TRUE
> x <- c(23, 26, 28, 19, 30)
> x <- c(x[1:3], x[4:length(x)])
> x <- c(x[1:3], x[4:length(x)]
+ x <- c(23, 26, 28, 19, 30)
Error: unexpected symbol in:
"x <- c(x[1:3], x[4:length(x)]
x"
> x <- c(x[1:3], x[4:length(x)]
+ x <- c(x[1:3], x[4:length(x)])
Error: unexpected symbol in:
"x <- c(x[1:3], x[4:length(x)]
x"
> x <- c(23, 26, 28, 19, 30)
> x <- c(x[1:3], x[4:length(x)])
> num1 <- c(23.4344, 34.4534467)
> round(num1, digits=2)
[1] 23.43 34.45
> floor(num1)
[1] 23 34
> ceiling(num1)
[1] 24 35
```