Week 4 Tutorial: Functions in R

POP77001 Computer Programming for Social Scientists

Module website: tinyurl.com/POP77001

Exercise 1: Functionals

- As R is a functional language, many of iteration routines can be avoided.
- For example, instead of creating a loop for calculating standard deviations,
- We are more likely to run a function `apply(<object_name>, 2, <function_name>)` to calculate the desired summary statistic for each of the variables (more on the `apply`-family of function in the next lecture)
- Apply this function to the matrix from the exercise above
- Now, change 2 in the function call to 1
- What do you see? What do the current numbers show? Does this summary make sense and why?

In [2]:

```r
# When dealing with random number generation it's always a good idea to
# by setting the seed with set.seed(function)
set.seed(2022)
# Here we create a matrix of 30 observations of 5 variables
# where each variable is a random draw from a normal distribution with
# and standard deviation drawn from a uniform distribution between 0 ar
mat <- mapply(
  function(x) cbind(rnorm(n = 30, mean = 0, sd = x)),
  runif(n = 5, min = 0, max = 10)
)
```

Exercise 2: Functions

- Let's turn to a more complicated case
- Below you can see another matrix object, but this time it's interspersed with letters
- What is the type of this matrix?
- Write a function that can take this matrix as an input and return a list, where each element is a column of the input matrix
- Internally, you can re-use the loop from the previous exercise
- In addition to that while building iteratively your list try checking whether a column is coercible into numeric

In [3]:

```
set.seed(2022)
mat2 <- cbind(
  letters[sample.int(26, 30, replace = TRUE)],
  mapply(
    function(x) cbind(rnorm(n = 30, mean = 0, sd = x)),
    runif(n = 3, min = 0, max = 10)
  ),
  letters[sample.int(26, 30, replace = TRUE)]
)
```

In [3]:
```
set.seed(2022)
mat2 <- cbind(
  letters[sample.int(26, 30, replace = TRUE)],
  mapply(
    function(x) cbind(rnorm(n = 30, mean = 0, sd = x)),
    runif(n = 3, min = 0, max = 10)
  ),
  letters[sample.int(26, 30, replace = TRUE)]
)
```

In [4]:
```
mat2
```

```
      [,1] [,2]               [,3]               [,4]
[,5]
 [1,] d    -1.18038087560726  -6.35184665056099 6.4013479670112
6   m
 [2,] s    0.49529520398723   6.74999582453749  -5.672917518864
82  r
 [3,] n    -10.2849100043719  -6.23965061855095 2.7034160636303
3   b
 [4,] w    2.62732832875833   -10.5186212910135 13.881364748562
8   k
 [5,] k    8.43376420072048   16.3743593545264  -7.858548086429
5   n
 [6,] d    -4.56831676756726  -1.95939289876253 -2.465886595748
89  n
 [7,] f    -2.68968793100288  -6.95025762066981 -6.267373220664
14  c
 [8,] n    1.55814851853814   1.19113955364451  -5.034589199645
78  c
```

```
 [9,] i    -1.49656012347671  2.36220905755359  -7.062044247303
22  w
[10,] n    -8.64174792519736  7.25922555444158  -8.828596531384
37  i
[11,] x    0.749092161247225  -2.31381454242788 -2.892457054018
9   e
[12,] g    7.37151938929682   -17.4648972554125 -0.177644057165
499 f
[13,] r    7.76884834394794   7.77677627002097  0.4412092634736
49  x
[14,] w    -0.836063579899988 -0.14532187496821 1.9746376855820
1   u
[15,] p    1.90990584101331   7.26740737092216  1.5846183501927
3   r
[16,] v    8.95418325823365   1.03116490722944  3.3264022853443
w
[17,] e    6.22613780959343   0.170670024252898 4.5739036518596
1   e
[18,] a    -11.9471881659684  -12.4377759555859 10.165545553342
2   r
[19,] s    5.26996913144926   12.1976453254292  -2.648523724813
98  q
[20,] a    -0.388245533741773 9.64587283453951  5.4828180387870
8   t
[21,] b    -1.94462263945741  4.04888577912626  -7.527434942508
88  z
[22,] z    5.15893083495564   -15.9629773401936 -1.967824018475
92  b
[23,] g    -2.07811859604411  2.82431456786277  3.4480702459320
4   s
[24,] l    -5.90207697263666  13.5908867575834  -1.919142415700
```

```
14  e
[25,] o    7.01802933488993   -1.47137005936308 -4.832979114384
36  s
[26,] l    -7.95447536414454  9.93418123747122  -1.073892048836
53  o
[27,] f    -0.803952437964523 10.3718098501839  -8.181516580795
67  c
[28,] g    -4.72580786636363  10.3439444385745  -2.226437092346
08  n
[29,] v    18.766051380095    -12.4676043292818 6.1694598033517
2   c
[30,] e    5.32251081590793   4.70062748355917  -2.825762396870
87  q
```

Week 4

- Practice functions in R