Programming Structures

Practice

1. Create a for loop that goes through a numeric sequence, computes e to the power of each value and if the result is greater than 1000 it stores this result in another vector.

2. Create a for loop that extracts the square root from the positive values in a numeric matrix and stores these roots in a vector.

3. Create a for loop that replaces the negative values in a numeric matrix with a random integer between 1 and 10. At the same time, it counts the negative values and prints their number.

4. Create a for loop that computes, for each component in a numeric vector, its double, its triple and its quadruple. Then it stores these values in a separate vector. Finally it creates a matrix by binding the newly created vectors as rows. (The matrix will have the same number of rows as the initial vector length.)

5. Create a for loop that checks whether a numeric vector has at least two zeros in a row. If so, it prints the position (index) of the first zero.

6. Create the following functions in R:

$$f(x) = \frac{3x}{x^2 + x + 1}$$

$$f(x, y) = \frac{e^x + 1}{3y - 5}$$

$$f(x,y,z) = 1 + \frac{1}{x} + \frac{1}{y} + \frac{1}{z} + \frac{1}{xyz}$$

Call these functions for various values of the arguments.

7. Create functions that perform the operations described at the exercises 1-5.

8. Create a function that checks whether a whole number is a multiple of 3, 5 and 7 at the same time.

9. Create a function that returns the sum of the first k even numbers (strictly positive). For example, f(4) should return the sum of 2, 4, 6 and 8.

10. Create a function that returns the product of the first k triangular numbers. The triangular numbers have the form k(k+1)/2, where k is a natural number, greater than or equal to 1. For example, f(3) should return the product of 1, 3 and 6, the first three triangular numbers.

11. Create custom binary operation that compute the following:

$$\frac{a^2 + b^2}{a + b - 1}$$

$$e^{a+b+ab}$$

$$\frac{|a + b|}{|ab|}$$