Statistics for Intelligent Systems
01.03.2022

Exercise 1.   1. On the command line, type "demo(graphics)". Follow prompts.

2. On the command line, type "demo(image)". This demonstration is concerned with representations of 3D data.

3. Get help on the function q, by typing "?q".

4. Quit R, by typing "q()"

Exercise 2. Create the following vectors:

1. $(1,2,3,\ldots,19,20)$

2. $(20,-19,\ldots,2,-1)$

3. $(1,2,3,\ldots,19,20,19,18,\ldots,2,1)$

4. $(4,6,3,4,6,3,\ldots,4,6,3)$ where there are 10 occurrences of 4.

5. $(4,6,3,4,6,3,\ldots,4,6,3,4)$ where there are 11 occurrences of 4, 10 occurrences of 6 and 10 occurrences of 3.

6. $(4,4,\ldots,4,6,6,\ldots,6,3,3,\ldots,3)$ where there are 10 occurrences of 4, 20 occurrences of 6 and 30 occurrences of 3.

7. $(0.1^3 0.2^1, 0.1^6 0.2^4, \ldots, 0.1^{36} 0.2^{34})$

8. $(2, \frac{2^2}{2}, \frac{2^3}{3}, \ldots, \frac{2^{25}}{25})$

Exercise 3. Calculate:

1. $\sum_{i=10}^{100}(i^3 + 4i^2)$

2. $\sum_{i=1}^{25}(\frac{2^i}{i} + \frac{3^i}{i^2})$

Exercise 4. Suppose:

$$A = \begin{pmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{pmatrix}$$

Check that $A^3 = 0$.
Replace the third column of A by the sum of the second and third columns.

Exercise 5. Create a 6x6 matrix "matE" with every entry equal to 0. Use the "col" and "row" functions to create:

$$\begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix}$$

Exercise 6. Solve the following system of linear equations in five unknowns

$$\begin{cases} x_1 + 2x_2 + 3x_3 + 4x_4 + 5x_5 = 7 \\ 2x_1 + x_2 + 2x_3 + 3x_4 + 4x_5 = -1 \\ 3x_1 + 2x_2 + x_3 + 2x_4 + 3x_5 = -3 \\ 4x_1 + 3x_2 + 2x_3 + x_4 + 2x_5 = 5 \\ 5x_1 + 4x_2 + 3x_3 + 2x_4 + x_5 = 17 \end{cases}$$

by considering an appropriate matrix equation Ax=y.

Exercise 7. Find the factors of the number 256742.

Exercise 8. Print the numbers from 1 to 100 and print "Fizz" for multiples of 3, print "Buzz" for multiples of 5, and print "FizzBuzz" for multiples of both.