# Programming in R

## Exercises of basic concepts

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1. Exercise I: Create the following vectors

   (a) $[10, 11, 12, \ldots, 38]$

   (b) $[30, 29, 28, \ldots, 1]$

   (c) $[1, 2, 3, 4, 3, 2, 1]$

   (d) $[2, 4, 6, \ldots, 16, 18, 20]$

   (e) $[1, 2, 3, 1, 2, 3, \ldots, 1, 2, 3]$

   The pattern 1, 2, 3 is repeated 10 times

   (f) $[1, 2, 3, 1, 2, 3, \ldots, 1]$

   It is the vector of e) where the last two values have been removed

   (g) ["label 1", "label 2",..., "label 30"]

   **Help:** Use the function paste: help(paste) or ?paste

   (h) ["label-1", "label-2",..., "label-30"]

   (i) $x^2 e^x$ , $x = 0.1, 0.2, \ldots, 1$

2. Exercise II: Calculate the followings sums with and without using loops

$$\sum_{j=5}^{23} \left(j^2 + 3 * j^{0.5}\right)$$

$$\sum_{i=1}^{18} \frac{1.3^i}{i}$$

$$\sum_{i=1}^{10} \sum_{j=1}^{6} \frac{i^4}{3+j}$$

**Help**: Use the function *outer*

3. Exercise III:

(a) What does the next code do?

```
set.seed(75)
M = matrix(sample(1:10, size=60, replace=TRUE), nrow=6, ncol=10)
```

(b) Find the number of entries in each row that are greater than 4

(c) Replace the third column of the previous vector $M$ by the sum of the second and third column

4. Exercise IV:

Write a function which takes a single argument which is a matrix.

The function must return a matrix which is the same as the function argument but every odd number is doubled.