Vectors

Practice

1. Using the c() function, create a vector with the following values: 7, 22, -9, 14, 6.

2. Create a vector that repeats four times the vector created at the exercise #1.

3. Create a vector that repeats four times the vector created at the exercise #1, element-wise.

4. Create a vector that contains a sequence of 30 numbers between 1 and 100.

5. Create a vector that contains a sequence of numbers between -5 and 55, with a step of 2.

6. Create a vector that contains the sequence created at #4, plus the following components: 73, 39 and 99.

7. Create a vector that contains two sequences of integers: the first one from 4 to 12 and the second one from 38 to 20.

8. Create a vector of 10 discrete random numbers between 1 and 70, with and without replacement.

9. Create a vector of 30 discrete random numbers between 25 and 145, with and without replacement.

10. Create a vector of 100 discrete random numbers between 3 and 9.

11. Create a vector that contains a sequence of integers between 0 and 9, plus a sequence of 50 numbers between 10 and 45.

12. Create a vector of 20 normally distributed numbers with the mean of 3 and the standard deviation of 10.

13. Create a vector of 20 uniformly distributed numbers between 1 and 50.

14. Repeat the vector created at #13 three times, element-wise.

15. Create a vector that contains a sequence of 20 numbers between 1 and 50, then access the following components:

    - the third, the tenth and the fourteenth component
    - all the components from the fourth to the eighth
    - the components from the fourth to the eighth, plus the fifteenth component.

16. From the vector created at #15 remove the following components
    - the components from the second to the tenth
    - the first, the fifth and the eleventh component.

17. Name the components of the vector created at #1 with the letters from a to e, then remove the names.

18. Create a vector of 20 discrete random numbers between 1 and 100, with replacement, then access the following components:

    - the components that are smaller than or equal to 45
    - the components that are greater than or equal to 62
    - the components that are greater than 10 and smaller than 70
    - the components that are smaller than 90 or greater than 50
    - the components that are smaller than 40 or equal to 76

19. For each statement below, create a vector x for which the statement returns TRUE. The vector must have 4 components.
    - all(x>10)
    - any(x>10)
    - all(x<100)
    - any(x<100)
    - all(x==3)
    - any(x==15)
    - all(x>10&x<70)
    - any(x>10&x<70)
    - all(x>10|x<70)
    - any(x>10|x<70).

20. For each statement at #19 create another vector x for which the statement returns FALSE.

21. Create a vector that contains a sequence of 17 numbers between 1 and 25. For this vector compute the sum and the product of the components, as well as the mean and standard deviation of the components.

22. Apply the following vectorized operations to the vector created at #21: logarithm, exponentiation, sin, round, floor and ceiling.

23. Create the vector with the following values: 4, 7, 22, 45, NA, 31, 70, NA, 44. Then remove the NA values and compute the mean and the standard deviation of the vector components.

24. Explain the difference between NA and NULL.

25. Create a vector of 10 discrete random numbers between 1 and 500, then sort it ascendingly and descending.

26. Create two vectors of 10 discrete random numbers between 1 and 500 and then find out the maximum and minimum value for each pair of components.

27. Create an ifelse() function that does the following: if the component of a vector is a multiple of three, it is divided by three, otherwise it is replaced with -1.

28. Create an ifelse() function that does the following: if the component of a vector is an integer number, it is copied, otherwise it is rounded. *Hint*: to check whether a value is an integer we use the is.integer() function.

29. Create an ifelse() function that does the following: if the component is greater than zero it writes “OK”, otherwise it writes “Wrong”.

30. Create two vectors of different lengths (3 and 5, for example) and then add and multiply them. Explain how recycling works.

31. For every statement below, create two vectors x and y for which the statement returns TRUE. Both vectors must have at least 4 components.

    - x > y
    - x < y

- x == y
- all(x>y)
- all(x<y)
- any(x>y)
- any(x<y)
- any(x==y)
- identical(x, y)
- all.equal(x, y)

32. For every statement at #31, create two vectors x and y for which the statement returns FALSE. Both vectors must have at least 4 components.

33. Create a vector that contains a sequence of integers from 1 to 7, then another vector that contains a sequence of real numbers between 1 and 7, with a step of 1. Are these vectors identical? Check and explain why, or why not.

34. Compute the correlation between the following two vectors: (6, 8, 24, 52, 16, 31, 4) and (50, 55, 71, 73, 65, 60, 12). Briefly interpret the R output.