Exercises

1. Create the following variables, checking that value and type are correct (using print and type):
   a. a and b with values 12 and 23 as integers.
   b. x and y with values 21 and 14 as floats.

2. Using print (once), print:
   a. All the above variables in the same line.
   b. All the above variables separated by ; on the same line.
   c. The text "the product of a and b is a * b", replacing a, b and a * b with the variable values.

3. Find the value and the type of:
   a. The product of a and b.
   b. The division of x by y.
   c. The integer division of a by b.
   d. The integer division of x by y.
   e. The product of b and y.
   f. 2 to the power 0.
   g. 2 to the power 100.
   h. 2 to the power 1.2.
   i. 2 to the power -2.
   j. The square root of 4.
   k. The square root of 2.

4. What is the difference between:
   a. 10 / 12
   b. 10 / 12.0
   c. 10 // 12
   d. 10 // 12.0
   e. 10 % 3
   f. 10 % 3.0

5. Using pi = 3.141592 and given r = 2.5, calculate:
   a. The circumference of a circle with radius r: $2\pi r$.
   b. The area of a circle with radius r: πr^2.
   c. The volume of a sphere with radius r: $\frac{4}{3}\pi r^3$.

6. *Create 2 variables a = 100 and b = True. Using an adequate number of extra variables (with arbitrary names!), give the value of a to b and vice versa. (Writing a = True and b = 100 is not sufficient!) Can it be done with only one extra variable?

7. On the same strand of DNA there are 2 genes. The first includes nucleotides from position 10 to position 20, the second nucleotides from position 30 to position 40. Let us write this:

   gene1_start, gene1_end = 10, 20
   gene2_start, gene2_end = 30, 40

   Given a variable pos representing an arbitrary position on the DNA strand, write some comparisons to verify if:
   a. pos is in the first gene.
   b. pos is in the second gene.

c. pos is between the start of the first gene and the end of the second.
d. pos is between the start of the first gene and the end of the second, but not in any of the genes.
e. pos is before the start of the first gene or after the end of the second.
f. pos is inside one of the genes.
g. pos is distant no more than 10 nucleotides from the beginning of the first gene.