

Lesson 2. Data and Operators in Java

Data types and variables

- 1) Which data type would you use to represent the following values?
 - a) Child age
 - b) Employee salary
 - c) Whether somebody has children or not
 - d) Apartment letter
- 2) Define a Java variable named `NewLine` storing the *new line* character. Print it.
- 3) Declare two `float` variables (`x` and `y`) and assign them values 2.5 and 5.4 (with separated declaration and initialization)
- 4) Declare two `float` variables (`x` and `y`) and assign them values 2.5 and 5.4 (declaration and initialization in the same sentence)
- 5) Find the errors in the following Java sentences:
 - a)

```
int a, b, c
a = 0
```
 - b)

```
System.out.println('ab');
```
 - c)

```
System.out.println( (3 + 2) - 1) );
```
 - d)

```
int a = 3.2;
```
 - e)

```
float a = 2.1;
int c = a;
```
 - f)

```
int i = 10;
float b;
i = b;
```
 - g)

```
int x;
{
    x = 10;
}
System.out.println(x);
```
 - h)

```
boolean a, b;
a = false, b = true;
```
 - i)

```
int x;
x = 1;
r = x + 1;
```
 - j)

```
String s = 'This is a string';
```

Arrays

- 6) Declare an array to store the following data, in such a way that the array *mirrors* the structure of the data (initialization is not required):

E.g.: The names of the people living a building with 4 floors and 5 apartments (1 person per apartment)

```
int [][] peopleInTheBuilding = new int[4][5];
peopleInTheBuilding[0][1] = "John Lennon";
peopleInTheBuilding[0][2] = "George Harrison";
...
```

(According to the definition, "John Lennon" is living in floor 0, apartment 1.)

- a) The results of the sports-lottery (*quinela*) (1 day, 15 results)
- b) The results of the sports-lottery (1 season of 38 match days, each one with 15 results)
- c) The results of the sports-lottery (10 seasons, each one with 38 match days)
- d) The name of the people in a hospital. The hospital has 5 floors, each one with 20 rooms, and each room with two patients.
- e) The painting in the figure of exercise 8.

Operators

- 7) Find the value of the variable result after executing the following sentences:

```
int a;
int b;
int result;
```

- a)

```
a = 4;
b = 12;
result = a + b / 3;
```

8
- b)

```
a = 3;
a = a + 3;
b = 2;
result = a - b;
```

4
- c)

```
a = 2;
b = a + 1;
a = b + 2;
result = a + b + a;
result = -result;
```

-13
- d)

```
a = 3;
b = 11;
result = (b % a) + 1;
```

3
- e)

```
a = 3;
b = a++;
result = 1;
result += a - b;
```

2

```
f) String s = "jjj";
    String t = "xxx"; *nothing
    String result2 = s + s + t;
```

- 8) Write an application that displays a box, an oval, an arrow and a diamond using asterisks (*), as follows:



- 9) Develop a Java program that reads a temperature value in Celsius degrees from the keyboard and transforms it to Fahrenheit degrees. The program must print the two values in the form: *X Celsius degrees are Y Fahrenheit degrees.*

(Remember: $\frac{F-32}{9} = \frac{C}{5}$)

- 10) Develop a Java program to calculate the following statistical parameters of three values x_1, x_2, x_3 read from the keyboard. Print the results.

a) Mean: $\mu = \frac{(x_1 + x_2 + x_3)}{3}$

b) Variance: $\sigma^2 = \frac{(x_1 - \mu)^2 + (x_2 - \mu)^2 + (x_3 - \mu)^2}{3}$

c) Standard deviation: $\sigma = \sqrt{\sigma^2}$

- 11) Develop a Java program to exchange the values of two integer variables (e.g.: if x is equal to 10 and y is equal to 5, at the end of the program, x must be equal to 5 and y equals to 10). (Initialize the variables in the code; do not read from the keyboard.)
- 12) Using only the programming techniques you learned in this lesson, write an application that calculates the squares and cubes of the numbers from 0 to 10 and prints the resulting values in table format, as shown below.

number	square	cube
0	0	0
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
6	36	216
7	49	343
8	64	512

9	81	729
10	10	1000

- 13) Develop a Java program that reads the three coefficients (a, b, c) of a 2nd grade polynomial ($ax^2 + bx + c = 0$) and obtains and prints the values of x.

(Remember: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$)

What happens when a is equal to 0?

- 14) Develop a Java program that, given an integer value representing a number of seconds, transform it to an expression in hours, minutes, and seconds (e.g. 3680 seconds are 1 hour, 1 minute, and 20 seconds).

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