

Programming Basics – live exercises 2

Fundamental language concepts

Task 1: Fill in the gaps on data types

Fill in the gaps in the following text by adding missing words in the marked areas.

- (1) The programming language Java has 8 primitive data types.
- (2) The `char` data type uses 2 byte(s).
- (3) The `byte` data type uses 1 byte(s).
- (4) The `int` data type uses 4 byte(s).
- (5) The `long` data type uses 8 byte(s).
- (6) A language that distinguishes between upper case and lower case letters is called case-sensitive.
- (7) The literal `23.8E+3` has the data type float = 256.
- (8) The `byte` data type can be used to represent the value range from -128 to 127.
- (9) The literal `'A'` has the data type char.
- (10) The control character for a new line is represented by the following literal: `'\n'`.
- (11) The accuracy of the `float` data type is approximately 6 decimal places.
- (12) The accuracy of the `double` data type is approximately 15 decimal places.
- (13) The literal `"smile"` can be represented by the string data type.

Task 2: Characteristic properties of variables

Decide whether the following statements are true or false.

	True	False
A variable includes an identifier or value.	X	
A value is represented by a literal.	X	
Constants are special cases of variables. They can only ever be accessed for writing.		X
A type must be specified for every variable. For example, the type specification <code>int</code> is used for the value range of integers (whole numbers) and <code>double</code> is used for the value range of decimal numbers.	X	
If a variable is introduced into the programme, it must first be accessed for writing, so that it has a value. Only then can it be accessed for reading.		X

Task 3: Definition of variables

Have a look at the following variable definitions. Which of the definitions are correct? Explain any errors you find.

1. `int number;`
2. `int myNumber, yourNumber;`
- ✓ 3. `long good-bye;`
4. `boolean isMarried;`
- ✓ 5. `short byte;`
- ✓ 6. `byte the tip;`
- ✓ 7. `boolean false;`
- ✓ 8. `int sum/counter;`
- ✓ 9. `int 8ball;`
10. `int counter = 15;`
- ✓ 11. `double salary = 2645.34€;`
12. `boolean isMarried = false;`
- ✓ 13. `char 'A' = letter;`
- ✓ 14. `byte b = 324;`
- ✓ 15. `double speed = 34567,45;`
16. `double offset = -1.7e7;`
17. `char controlCharacter = '\t';`
18. `char thatIsMuchTooLong = 'Z';`

Task 4: Assignment instructions

What value is in the respective variable after processing the following instructions (statements)?

(1)

```
int sum;  
sum = 42 - 12;
```

30

(2)

```
int amount = 8;  
amount = 15;
```

15

(3)

```
int extra, value;  
extra = 5;  
value = extra + 2;
```

5, 7

(4)

```
int number;  
number = 8;  
number = number + 12;
```

20

(5)

```
int counter = 0;  
counter = counter + 1;  
counter = counter + 1;
```

2

Task 5: Correct expressions

Decide whether the following expressions are correct or incorrect. Assume that all variables have been defined properly.

(1) 55

✓(2) 18 - 3)

(3) x + 3

✓(4) sum + * 3

(5) (18 - 5)

(6) sum * 34/2

✓(7) 3.14y

(8) 12 - 4/2 + 2

✓(9) 2(a - b)

(10) ((x + y) / z) / (a - b)

Task 6: Evaluating numerical expressions

Which of the following expressions are correct and which are incorrect? What is the value and type of the correct expressions?

- (1) $7 / 4$ **1,75**
 (2) $1/2 + 1/2$ **1**
 (3) $1.5 + 7 / 2$ **5**
 (4) $(12 + 0.0) / 7$ **~1,7**
 (5) $(1/2 + 3.5) / 2.0$ **2**
 (6) $372 \% 100$ **72**
 (7) $-7 \% 5$ **-2**
 (8) $(23 / 7 \% 4) + 1$ **$4\frac{2}{7}$**
 (9) $(23 \% 4 \% 4 \% 4 \% 4 \% 4) + 1$ **4**
 (10) $24 / 8 \cdot ((-3)) / 2$ **-4,5**

Task 7: Relational operators

What values are assigned to the result variable?

- (1) `boolean result = 5 < 7;`
 (2) `result = 5 > 7;` **f**
 (3) `result = 5 <= 5;` **+**
 (4) `result = 5 >= 5;` **+**
 (5) `result = 5 != 7;` **+**
 (6) `result = 5 == 7;` **f**

Task 8: Boolean expressions

Produce the appropriate Boolean expressions for the following scenarios. You need to define a Boolean variable that represents the facts/situation appropriately.

- If there are only two beers left in the fridge, a new case of beer should be bought.
- It's great when it's a public holiday, but not a weekend.
- A shoe purchase is possible if there is more money in the wallet/purse than the price of the shoe, or if the bank card is available and there is enough money in the account.

boolean lowStock <= 2

boolean great = holiday && !midweek

**boolean shoe = wallet > price || cardAvailable
&& bank > price**