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 ….. primitive data types.

(2) The `char` data type uses…… byte(s).

(3) The `byte` data type uses …… byte(s).

(4) The `int` data type uses…… byte(s).

(5) The `long` data type uses…… byte(s).

(6) A language that distinguishes between upper case and lower case letters is called …… .

(7) The literal 23.8E+3 has the data type …… .

(8) The byte data type can be used to represent the value range from …... to ……. .

(9) The literal **'A'** has the data type …… .

(10) The control character for a new line is represented by the following literal: …… .

(11) The accuracy of the float data type is approximately…… decimal places.

(12) The accuracy of the double data type is approximately…… decimal places.

(13) The literal **"smile"** can be represented by the …….. 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.		
A value is represented by a literal.		
Constants are special cases of variables. They can only ever be accessed for writing.		
A type must be specified for every variable. For example, the type specification `int` is used for the value range of integers (whole numbers) and `double` is used for the value range of decimal numbers.		
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.		

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;
```

(2)

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

(3)

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

(4)

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

(5)

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

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
(2)  1/2 + 1/2
(3)  1.5 + 7 / 2
(4)  (12 + 0.0) / 7
(5)  (1/2 + 3.5) / 2.0
(6)  372 % 100
(7)  -7 % 5
(8)  23 / 7 % 4 + 1
(9)  23 % 4 % 4 % 4 % 4 % 4 + 1
(10) 24 / 8(((-3))) / 2
```

Task 7: Relational operators

What values are assigned to the `result` variable?

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

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.

1. If there are only two beers left in the fridge, a new case of beer should be bought.

2. It's great when it's a public holiday, but not a weekend.

3. 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.