Exrcises 2: types and display

Exercise 2.1: Terminology

This Is a piece of Java code: (x * 3) + 1
- What name do we give to this piece of code as a whole?
- What are the operators?
- What are the operands of *?
- What are the operands of +?
- What kind of thing is x in this piece of code?
- What type may possibly be x?
- What is the type of 3 and 1?
- What is the type of (x * 3) + 1?
- What is the value of (x * 3) + 1?

Exercise 2.2: execution traces

In this exercise, we will give programs that should be executed manually, step by step. We will monitor the content ofthe memory and display each line of code. First we will offer you an example to illustrate what we expect as a response.

Exemple

```
1  public class Conversion {
2      public static void main (String[] args) {
3          double euros;
4          double renminbis;
5          Terminal.ecrireStringln("Somme en euros? ");
6          euros = Terminal.lireDouble();
7          renminbis = euros * 6.559;
8          Terminal.ecrireStringln("La somme en renminbis: "+renminbis);
9      }
10 }
```

The following table gives the value of variables corresponding to each line of code. Before line 3, the variables do not exist. Note that with a NEP in the corresponding column. Note by ? the contents of variables declared but not initialized.

3	euros NEP	renminbis NEP	keyboard	display
4	?	NEP		
5	?	?		Somme en euros ?
6	10	?	10	
7	10	65.59		
8	10	65.59		La somme en renminbis : 65.59

The first column contains a line number and the other columns contain variable values after executing this line of code and the effects occurring during the execution. The first line of the table is to give the initial state, before taking into account the first line of code. Keyboard input are arbitrary, the choice of the user program.

Exercise 2.3 : a program

```
1  public class Td1 {
2      public static void main (String [] arguments)
3        {
4          int n =2;
5          char c;
6          boolean b;
7          Terminal.ecrireStringln("exo 2.2");
8          Terminal.ecrireDoubleln(3.0+2);
9          n=3+2;
10         n=n+n;
11         int m;
12         m=n+(2*(n+2));
13         Terminal.ecrireIntln(m);
14         Terminal.ecrireIntln(n);
15       }
16 }
```

Question 1

In this program, ie what are the declarations, method calls and assignments.

Question 2

Give an execution trace of the program in the form of a table.

Exercise 2.4: Boolean expressions

Boolean operators

```
1  public class Test{
2      public static void main(String[] args){
3          boolean a, b, c;
4          Terminal.ecrireBooleanln(true && false);
5          a = true;
6          b = true;
7          c = true;
8          Terminal.ecrireBooleanln(b && c);
9          Terminal.ecrireBooleanln(!a);
10         Terminal.ecrireBooleanln(!a || (b && c));
11     }
12 }
```

Questions:

What does this program display at runtime?
Recall that the **&&** operator is a logical **and** (conjunction), the | | operator is a logical **or** (disjunction) and **!** logic **non** (negation).

Comparison operators

```
1  public class Test2{
2      public static void main(String[] args){
3          char a = 'x';
4          int n = 2;
5          Terminal.ecrireString("Valeur de 5 > 3: ");
6          Terminal.ecrireBooleanln(5>3);
7          Terminal.ecrireString("Valeur de a == 'b': ");
8          Terminal.ecrireBooleanln(a == 'b');
9          Terminal.ecrireString("Valeur de (n>=0) && (n<=100): ");
10         Terminal.ecrireBooleanln((n>=0) && (n<=100));
11     }
12 }
```

Questions:
What does this program display at runtime?
Recall that the operator **== t**ests for **equality** of two values of the same type and **> =** and **<=** are the notations for comparisons **≥** and **≤.**