Exercises: 8 Functions

Exercise 8.1 program adaptation

The following program calculates the integer division of a number by another number using the subtraction to calculate the result without using the / operator.

```
1  public class Exo8_1{
2      public static void main(String[] args){
3          int x,y,cour,res;
4          Terminal.ecrireString("Entrez le nombre x: ");
5          x = Terminal.lireInt();
6          Terminal.ecrireString("Entrez le nombre y: ");
7          y = Terminal.lireInt();
8          res = 0;
9          cour = x;
10         while(cour>=y){
11             cour=cour-y;
12             res = res + 1;
13         }
14         Terminal.ecrireString("" + x + "/" +y + "= ");
15         Terminal.ecrireIntln(res);
16     }
17 }
```

Question 8.1.1

Modify the program so that the calculation of the division is performed by a function with two parameters, x and y.

Question 8.1.2

What happens in case the second number entered is 0?
Modify the program so that an error is triggered when the divisor y is 0.

Question 8.1.3

Modify the program so that it also works for negative x or y.

Exercise 8.2 - Mathematical functions

Write a program with functions that calculate square and cube respectively the square and cube (or power 3) of a number of type `double`. The `main`() method should test these two functions on several examples.

Exercise 8.3 - Array equality

We have seen, in the lecture notes, that the equality (**==**) and inequality (**!=**) test on the array does not test equality of values in the arrays, but the identity of the array in terms of memory space. Accordingly, two arrays are equal if they **share the same memory space**.
Often, we want to compare two arrays : t1 and t2 to know if they have the same length and the same index elements, ie that t1 [i] == t2 [i] for any index i.
Write a function called `isEqual`() that performs this test for equality for arrays of type `int[]`.

Examples of outcomes for calls `isEqual`().

```
int[] t1 = {4, 5, 6}; int[] t2 = {4, 5, 6};
int[] t3 = {4, 5}; int[] t4 = {6, 5, 4};
isEqual(t1,t2) -->
true t1 == t2
--> false
estEgal(t1,t3) -->
false t1 == t3
--> false
estEgal(t1,t4) -->
false t1 == t4
--> false
```

Exercise 8.4 – Functions on Arrays

Question 8.4.1

Write a function that looks if an element belongs to an array of `char`. The desired character, and the table reference will be the two parameters of the function.

Question 8.4.2
Write a function that counts the number of occurrences of a character in a array, ie the number of times an item appears in a character array. The desired character, and the array will be two parameters of the function.

	caractère	tableau	résultat
	’z’	{’a’,’b’,’c’}	0
Exemples :	’a’	{’a’,’b’,’c’}	1
	’b’	{’a’,’b’,’c’,’b’,’d’,’b’,’a’,’d’}	3

Question 8.4.3
Write a function that takes two character arrays as parameters and tests whether all elements of the first array appear at least once in the second array. It can be used in the body of the function written in the answer to question 1.

Exercise 8.5 concatenating arrays

The concatenation operation takes two arrays and calculates an array containing the elements of the first array, and then, after them, the elements of the second array in the same order, but with a different index.
For example, the array t3 below is the concatenation of t1 and t2.

```
     0  1  2  3
t1 12 17 15 10
     0  1  2
t2 13 14 11
      0  1  2  3  4  5  6
t3 12 17 15 10 13 14 11
```

Write a function that computes the concatenation of two arrays of integers. Note that a function can return a result array as both an integer or a boolean. **Hint**: you need to create the result array in the body of the function.

Exercise 8.6 - display array

IThe following program displays the contents of array `AffichеTable` with a frame.

```
1  class Exo86{
2      static void afficheTable(int[] t){
3          Terminal.ecrireChar('+');
4          for (int i=0; i<t.length; i++){
5              Terminal.ecrireString("---+");
6          }
7          Terminal.sautDeLigne();
8          Terminal.ecrireChar('|');
9          for (int i=0; i<t.length; i++){
10             Terminal.ecrireString(" " + t[i] + " |");
11         }
12         Terminal.sautDeLigne();
13         Terminal.ecrireChar('+');
14         for (int i=0; i<t.length; i++){
15             Terminal.ecrireString("---+");
16         }
17         Terminal.sautDeLigne();
18     }
19     public static void main(String[] args){
20         int[] ex = {1,5,8,9,7};
21         int[] ex2 = {12, 5, 8, 123};
22         afficheTable(ex);
23         afficheTable(ex2);
24     }
25 }
```

The example shows that the method `afficheTable`() does not work if the array contains multi-digit numbers. The purpose of the exercise is to correct the program so that the array is shown well in all cases.

Question 8.6.1

At first, we will deal only with positive integers. The number of characters - to display in each loop depends on the number of digits of the value in the array at index **i**.

Question 8.6.2

Improve the program to work with negative integers, positive numbers or zero.