UFAZ / Strasbourg University

# Object Oriented Programming

Year 1 – Common curriculum

Tutorial / Lab session #1: Java fundamentals

NB: all the methods of exercises 1 to 6 are going to be defined as static

**Exercise 1 – Working with integers**

1. Write a method `int add(int a, int b)` that returns the sum of a and b
2. Write a method `int mult(int a, int b)` that returns the multiplication of a by b
3. Write a method `int max(int a, int b)` that returns the maximum of a and b.
4. Write a method `int min(int a, int b, int c)` that returns the minimum of a, b and c.
5. Write a method `int gcd(int a, int b)` that returns the greater common divider of a and b.

**Exercise 2 – Working with integer arrays**

1. Write a method `int min(int[] array)` that returns the smallest value stored in the array
2. Write a method `int find(int[] array, int value)` that returns the position of the first occurrence of value in the array. If the value is not found, the method returns -1.
3. Write a method `int sumArray(int[] array)` that returns the sum of all the elements in the array.
4. Write a method `void printArray(int[] array)` that prints the values stored in the array.
5. Write a method `int[] reverseArray(int[] array)` that returns a new array that stores the elements of the array given as argument.
6. Write a method `main` to test the above methods.

**Exercise 3 – Conditional statements**

1. Specify (give the signature) a method that asks a user to input 2 integers and returns:
    a. The sum of a and b if both integers are even
    b. The multiplication of a by b if both integers are odd
    c. Else, the square of each integers
2. Write your method using a Scanner for the keyboard inputs

**Exercise 4 – A basic calculator**

Write a program that apply an arithmetic operation between 2 integers that were asked to the user. The operand is ask with a basic menu : use a switch to analyze which operation should be performed. Here is an example of expected output :

```
Give 2 integers successively :
2
1
Choose an operation :
1. +
2. -
3. *
4. /
5. %
Operation : 1
Output : 2 + 1 = 3
```

**Exercise 5 – Two dimensional arrays**

Write a method `float[][] product(float[][] matA, float[][] matB)` that computes the products of matrices matA and matB. The method returns the resulting matrix or null, if the dimensions of the matrices don't match.

**Exercice 6 – Searching arrays**

1. Give the signature of a method that search a given integer value in an integer array. Implement your method : you must perform a "raw" search, *i.e.*: loop over the array from the start and compare each element to the searched value. Return the index of the value if it is found, else return -1.
2. Specify and implement a similar method to search for a value in a two dimensional array