Exercise series: Tutorial (TD) N°: 04

Exercise 1.
Write an algorithm which solves a first degree equation *ax+b=0* (*a,b* entered by the user)
> *Example:*   *a= 6 , b= 11 → x= -1.83*
> *a= 0 , b= 4 → no solution*
> *a= 0 , b= 0 → infinite set of solutions*

Exercise 2.
Write an algorithm that asks the user to enter the two limits *a* and *b* of an interval [*a*; *b*]. Check the entered values. Then ask it to enter *a* value *x*, tell it if x ∈ [*a*; *b*]
Example: Values entered: a=3 , b=9 → [3 ; 9] well-formed interval ;x = -2 → -2 does not belong to this interval
> *Values entered: a=6 , b=3 →malformed interval*

Exercise 3.
Write an algorithm that reads a time measured in hours, minutes and returns the time to the next minute.
Example :   *Time entered 09:45 → time after one minute 09:46*
> *Time entered 17:59 → time after one minute 18:00*

Exercise 4.
Write an algorithm that asks the user to enter a start time (hours + minutes) and an end time (hours + minutes too). This program must then calculate in hours + minutes the time elapsed between the start time and the end time.
> *Example: If the user enters 10:30 a.m. and 12:15 p.m.; the program should show him that the time*
elapsed between the start time and the end time is 1h45.
Suppose both times are in the same day, if the start time is after the end time, an error message should be displayed.
When entering hours, separate hours from minutes by asking the user to enter:
> *- start hour   - start minutes   - end hour   - end minutes*

Exercise 5.
Write an algorithm which allows you to enter the number of a day of the week and which displays "*Workday*" or "*Weekend*" depending on the day. Days are numbered 1 to 7 from *Monday* to *Sunday*.
Example: *Number of day entered 4 → the algorithm displays "Workday"*
> *Number of day entered 6 → the algorithm displays "Weekend"*

Practical Work

Exercise 1.   Write an algorithm that allows you to read a positive integer made up of 4 digits and tell if it is palindrome. *Example*: *1221, 9559 are palindromes, on the other hand, 1591 and 1225 are not.*

Exercise 2.   Write a program that reads two positive integers and informs us if one of them is divisible by the other. *Example:*   *Values entered 4 and 17 → none is divisible by the other*
> *Values entered 24 and 120 → 120 is divisible by 24*

Exercise 3.   Write a program asks the user to enter a character then it informs them if it is a letter or a digit or another character. (try to look up the ASCII code)
> *Example*:   *Entered character: '9' →is a digit*
> *Entered character: 'F' →is a letter*
> *Entered character: ' #' →is another character*

Additional Exercises

1. Write an algorithm with its program that allows solving a quadratic equation. $Ax^2 + Bx + C = 0$
2. Write an algorithm that allows you to read two positive integers composed of 4 digits and to say if they are symmetrical. Two numbers are said to be symmetrical if one of the numbers is formed from the inversion of the digits of the other. For example, 1548 and 8451 are symmetrical.
3. We index the squares of a chessboard with two indices i and j, both varying from 1 to 8. The square (i; j) is on row i and column j. By convention, the box (1; 1) is black.
   1. Write an algorithm asking the user to enter the two coordinates i and j of a box, and telling him whether it is a white or black box.
   2. Write an algorithm asking the user to enter the coordinates (i; j) of a first box and the coordinates (i'; j') of a second box. Then tell him if it is possible to move a knight from (i; j) to (i'; j4'
4. Body mass index (BMI) is a statistical indicator representing the relationship between body height and weight.
   BMI = **weight** in kg / **height²** in m.
   Write an algorithm that reads the height and weight and indicates the weight class of the person according to the intervals :

BMI	<= 18.5	18.5 - 24.9	25.0 - 29.9	>=30.0
Weight class	Underweight	Normal weight	Warning sign of overweight	Obesity