Tutorial series N°3

Exercise 1:

Write an algorithm that allows to enter a real number from the keyboard and calculates and displays its absolute value.

Exercise 2:

We say that two numbers are related if they are opposites or inverses.

Two numbers are opposites if their sum equals 0, and inverses if their product equals 1.

Write an algorithm that reads two real numbers and determines if they are related or not.

Exercise 3:

Write an algorithm for entering 3 integer numbers and displaying them in ascending order.

Exercise 4:

Write an algorithm that allows a hostess to calculate the price of a ticket based on the passenger's age. Children under or equal to 2 years old do not pay, those under 10 years old (between 3 and 9 years) pay half price, and people between 10 and 27 years old and those at least 70 years old (age equal to or greater than 70) receive a 10% discount. The user should enter the base ticket price and the passenger's age, and the algorithm calculates and displays the price to pay.

Exercise 5:

A store offers discounts to its customers based on the purchase amount under the following conditions:

- If the purchase amount is less than 2000 DA, there is no discount.
- If the purchase amount is between 2000 DA and 5000 DA, the amount above 2000 DA is subject to a 10% discount.
- If the purchase amount is greater than 5000 DA, in addition to the previous discount, the customer receives an additional 20% discount for the amount above 5000 DA.

Write an algorithm that reads the purchase amount and calculates and displays the net-to-pay, where:

Net-to-pay = purchase amount - discount amount

Exercise 6:

Write an algorithm performing addition, subtraction, multiplication, or division of two numbers based on the user's choice from a menu. The two numbers and the operation to be performed should be entered by the user.

Exercise 7:

Write an algorithm that repeatedly prompts for a student's mark (between 0 and 20) until a valid response is given. Use branching statements to achieve this.

Additional exercises

Exercise 8:

Write an algorithm that asks the user to enter two characters and calculates, then displays the number of characters that separate them.

Example: There are 4 characters between the letters 'K' and 'P'.

Exercise 9 :

Write an algorithm that allows to read the values of two boolean variables, 'a' and 'b', and check the two laws of Morgan:

1. $\left(\overline{a+b}\right)=\bar{a}\cdot\bar{b}$
2. $\left(\overline{a\cdot b}\right)=\bar{a}+\bar{b}$

Exercise 10:

Write an algorithm that allows a stationery to calculate the total cost of an order of paper reams. The unit price for a ream is 340 DA for a quantity exceeding 50 units or if the customer has made previous purchases from the seller. When the customer has no prior purchases, the unit price for a ream is 370 DA for a quantity between 20 and 50, and 400 DA for a quantity less than 20. The algorithm should input the order quantity and the number of previous purchases, then calculate and display the total amount to pay.

The algorithm should account for all possible cases, including input errors.

Exercise 11:

Ecrire un algorithme qui permet de résoudre une inéquation du premier degré de la forme:

Write an algorithm to solve a first-degree inequality of the form:

$$a\,x + b > 0$$

The values of 'a' and 'b' are entered by the user.

Exercise 12 :

Three switches, 'a,' 'b,' and 'c,' control the lighting of two lamps, 'R' and 'S,' following the following conditions:

- As soon as one or more switches are activated, lamp 'R' must turn on.
- Lamp 'S' should only turn on if at least two switches are activated.

Write an algorithm that allows input of the states of the 3 switches (1 for on and 0 for off) and then determines if lamps 'R' and 'S' are on or off.