

Abdelhafid Boussouf University Center - Mila
Institute of Science and Technology
Department of Process Engineering

Practical Work 03

Course title: Structure of Computers and Applications

Level: 1st year ST - ENG & LMD

By:

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Objective

This practical work aims to introduce students to the fundamental concepts of algorithm design and flowchart development. Through a series of exercises, students will learn to:

- Design algorithms for basic mathematical operations and problem-solving
- Create flowcharts to visually represent algorithmic processes
- Implement conditional statements and logical decision-making in algorithms
- Handle different data types and mathematical operations
- Develop solutions for real-world problems using algorithmic thinking
- Understand function evaluation and piecewise functions
- Create trace tables to verify algorithm correctness

The exercises progress from simple arithmetic operations to more complex problems involving conditional logic, equation solving, and function evaluation, providing a comprehensive foundation in computational thinking.

Exercise 01

- Write an algorithm and draw the flowchart to read two numbers and find their sum and subtraction.
- Write an algorithm and draw the flowchart to find the sum and product of two given numbers.

Exercise 02

- Write an algorithm to determine a student's final grade and indicate whether it is passing or failing.
- The final grade is calculated as the average of four marks and passing grade = 10.

Exercise 03

- Write an algorithm and flowchart to convert temperature from Fahrenheit to Celsius
- The formula to convert a given temperature from Celsius scale to Fahrenheit scale is:

$$F = \frac{9}{5} \times C + 32$$

Exercise 04

- Write an algorithm and flowchart to convert the input dollar to its peso exchange rate equivalent and display the peso equivalent exchange rate.
- Assume that the present exchange rate is 51.50 pesos against the dollar.

Exercise 05

- Write an algorithm and draw a flowchart that will read the two sides of a rectangle (length and breadth) and calculate its area and perimeter.

Exercise 06

- Write an algorithm and draw a flowchart to enter a positive integer (x) and print if it is odd or even?

Exercise 07

- Write an algorithm and draw a flowchart to enter x (number) and find the value of $y = \frac{x-3}{x}$.
- Write an algorithm and draw a flowchart to enter x (number) and find the value of $y = \frac{x}{x-2}$.

Exercise 08

- Write an algorithm and draw a flowchart to solve the linear equation:

$$aX + b = 0$$

discussing all possible cases of a and b.

Exercise 09

- Write an algorithm and draw a flowchart that will calculate the roots of a quadratic equation:

$$ax^2 + bx + c = 0$$

Exercise 10

- Write an algorithm and draw a flowchart to find the value of the below function. Input t and print y(t) to each value of t.

$$y(t) = \begin{cases} t & \text{if } t \geq 0 \\ -t & \text{if } t < 0 \end{cases}$$

Exercise 11

- Write an algorithm and draw a flowchart to find the value of the below function. Input x and print g(x) to each value of x.

$$g(x) = \begin{cases} \frac{2}{x-2} & \text{if } x > 2 \\ -\frac{4}{5-x} & \text{if } x \leq -2 \end{cases}$$

- Create a trace table using the following inputs: -5, -2, 0, 7, 11, 60.