AL-KAWTHAR UNIVERSITY

Department of Computer Science

CS 121 L – Programming Fundamentals (PF)

Lab # 01

Objective:

To introduce students to the concept of algorithms using basic arithmetic operations (+, -, ×, ÷) on two variables. Students will learn how to represent algorithms using pseudocode and flowcharts.

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Date of Lab Conducted	
Marks Obtained	
Remarks	
Signature	

LAB 1 - ACTIVITY 1

Introduce students to algorithm design using two variables **a** and **b** for basic arithmetic operations.

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(1) Define two variables a and b.

Two variables a and b are defined with datatype of integer,

(2) Write pseudocode to compute:

- **sum = a + b**
- **difference = a - b**
- **product = a × b**
- **quotient = a ÷ b (assuming that b ≠ 0)**

```
START
    READ a, b

    sum ← a + b
    WRITE sum

    difference ← a - b
    WRITE difference

    product ← a * b
    WRITE product

    IF b ≠ 0 THEN
        quotient ← a / b
        WRITE quotient
    ELSE
        WRITE "Error: Division by zero"
    ENDIF
END
```

(3) Draw flowcharts for each operation.

(4) Discuss input/output representation.

Input: Variables a, b

Output: sum, difference, product, quotient (or error message)

(5) Dry-run the algorithms with sample values.

Assuming a = 12 and b = 4.

```
16
8
48
3
```

LAB 1 - ACTIVITY 2

Convert the algorithmic logic into structured pseudocode.

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(1) Use standard pseudocode structure with START, READ, WRITE, IF, and END.

Already done in Lab Activity 1.

(2) For example:

```
START
   READ a, b
   sum ← a + b
   WRITE sum
   difference ← a - b
   WRITE difference
   product ← a * b
   WRITE product
   quotient ← a / b
   WRITE quotient
END
```

Already done in Lab Activity 1.

(3) Students write and present their own pseudocode individually.

Already done in Lab Activity 1.

LAB 1 - ACTIVITY 3

Help students visualize the control flow using flowcharts.

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(1) Draw flowcharts using standard symbols for:

- **Start/End**
- **Input/Output**
- **Processing**
- **Decision**

Flowchart drawn below …

(2) Attach the flowchart.

LAB 1 - ASSIGNMENT

Prepare a document that includes the following:

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(1) Definitions of algorithm and pseudocode.

Algorithm:

An algorithm is a step-by-step finite sequence of instructions used to perform a specific task or solve a problem. Algorithms are written in simple, logical language and are independent of any programming language.

Pseudocode:

Pseudocode is a human-readable representation of an algorithm that uses a mix of natural language and programming-like structures such as START, READ, WRITE, IF, and END. It is used to plan and communicate the logic of a program before writing the actual code.

(2) Algorithms for the following:

- **Add two variables "op1"and "op2". Store the sum in third variable "result".**

```
Step 1: Start
Step 2: Declare variables op1, op2, result
Step 3: Read values of op1 and op2
Step 4: result = op1 + op2
Step 5: Display result
Step 6: End
```

- **Multiple two variables "op1" and "op2". Store the product in the variable "product".**

```
Step 1: Start
Step 2: Declare variables op1, op2, product
Step 3: Read values of op1 and op2
Step 4: product = op1 * op2
Step 5: Display product
Step 6: End
```

(3) Attach Hand-drawn flowcharts.

Flowchart attached below: