

# Assignment 1

## Introduction to Algorithm and Some Fundamentals

### Exercise 1

Design an algorithm to calculate the area of a rectangle.

#### Instructions:

1. Analyze the problem to identify the necessary inputs and outputs.
2. Descriptive variable names that accurately represent the inputs, outputs, and intermediate values.
3. Determine the appropriate data types for each variable based on its purpose within the algorithm.
4. Describe the inputs, outputs, and the objective of the algorithm.
5. List the chosen variables along with their corresponding data types and provide brief explanations of their roles within the algorithm.

### Exercise 2

Design an algorithm to calculate the average grades of the students to assess their overall performance in the group.

#### Questions:

1. What are the necessary steps to solve this problem?
2. What information do you need to ask the user for?
3. What operations do you need to perform on this information?
4. What will be the final output of your program?

### Exercise 3

5. Design an algorithm to convert 27° from degrees Fahrenheit (F) to degrees Celsius
6. (C) using the following formula:  $C = (F - 32) / 1.8$

### Exercise 4

Which of the following are invalid variable names? Why?

Int	6_05	char	Calloc	Xx	floating	_1312	z	A\$
alpha_beta_routine			ReInitialize		B123	b123	12z	124

### Exercise 5

1. Execute the algorithm and provide the values of the variables a, b, and c.

Algorithm A ;

Var a, b, c : integer;

Begin

a ← 5 ; b ← a + 1 ; c ← a + b ;

end.

**Exercise 6**

Write an algorithm that takes hours and minutes as input, and calculates the total number of minutes, display the result.

**Exercise 7**

Write an algorithm that calculates the total cost of items purchased at a store.

Instructions:

1. Design an algorithm that prompts the user for the prices and quantities of the items purchased.
2. Calculate the total cost of each item by multiplying its price by its quantity.
3. Sum up the costs of all items to find the subtotal.
4. Add any taxes or discounts to the subtotal.
5. Calculate the total amount due by adding taxes to the subtotal and display the result.

**Example:** Input:

- Price of Item 1: 150.00 da
- Quantity of Item 1: 2
- Price of Item 2: 200.00 da
- Quantity of Item 2: 3
- Tax rate: 8%.

**Exercise 8**

What output would you expect from the following algorithm?

Algorithm A1;

Var

char c, d;

Begin

c = 'd';

d = c;

print ("d = ", d);

End.

**Exercise 9**

Write an algorithm to evaluate the polynomial shown here:

$$3x^3 - 5x^2 + 6, \text{ for } x = 2.5$$