

# CONTINUOUS ASSESMENT FOR INTRODUCTION TO ALGORITHM

Academic Year: 2021/2022

Class: B1A & B1B

Instructor: Mr NDENGE

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All contents are not authorized  
Duration: 2.1 hour 15 minutes

## **PART ONE: Knowledge on basic notions in algorithm (6 marks)**

### **Exercise 1: (2 mark)**

Define the following terms:

- Top down analysis
- Sub program
- Object of simple type
- Object of composite type

### **Exercise 2: (2 mark)**

- a) Give two differences between a while loop and a repeat loop
- b) Give two similarities between a while loop and a repeat loop

### **Exercise 3: (2 mark)**

- a) Give two differences between a procedure and a function
- b) List without explaining the characteristics of a record.

## **Part Two: Application (14 marks)**

### **Problem 1: (5.5 marks)**

Using the top down analysis, write an algorithm that solves a second-degree equation of the form  $ax^2 + bx + c = 0$ . The solution should include complex roots. You may decompose the solution as follows:

- a) Algorithmic Document (1 mark)
- b) Write a procedure to enter the coefficients of the equation (1 mark)
- c) Write a function that returns the discriminant (1 marks)
- d) Write a procedure that determines the roots of the equation (1.5 marks)
- e) Write an algorithm to coordinate the exchange of information amongst the sub programs. (1 mark)

### **Problem 2: (3 marks)**

Let's consider a two dimensional table Mat with N rows and M columns and a one dimensional table Vec of  $N * M$  elements:

Write an algorithm to transfer the elements of Mat to Vec. The transfer is carried out in the order column after column beginning from the first column. For the same column, the transfer is also done in order beginning from the element of the first row. The table Vec is filled from index 1 to index  $N * M$ . (3 marks)

### **Problem 3: (5.5 marks)**

- a) Write an algorithm that reads a positive integer n and displays a message indicating if n is a prime number. Recall that a prime number is a number that has only two positive factors i.e 1 and itself. (1.5 marks)
- b) Write an algorithm that reads a strictly positive integer n and displays a message indicating if n is a perfect number. Recall that a number n is said to be perfect if the sum of its factors (excluding n) is equal to n. Example:  $6 = 1 + 2 + 3$  (2 marks)
- c) Write an algorithm which reads two positive integers A and B. Then calculates and displays the lowest common multiple (LCM). (2 marks)

You may test your Algorithm whenever you write to be sure it works. Good Luck! Merry Christmas and Happy New Year!