



COMSATS UNIVERSITY ISLAMABAD, ISLAMABAD CAMPUS

DEPARTMENT OF COMPUTER SCIENCE

Mid-Term Examination, FALL 2023

Class: BSCS, BSSE, BDS, BAI, BCT

Subject: CSC103-Programming Fundamentals

Instructor:

Marks: 25

Time allowed: 80 Min

Instruction:

1. Attempt all questions.
2. Mobile phones or digital devices are not allowed.
3. Return question paper along with answer sheet

————(CLO-1)-Demonstrate the fundamental concepts of programming————

Question# 1: Compare and contrast the programming paradigms.

(4 marks)

————(CLO-2)- Employ programming constructs using a programming language————

Question# 2:

(5 marks)

Mr. Ali, a mathematician, is studying a unique sequence of integer numbers. The sequence is generated by a special process, and it ends with the number 0. Mr. Ali is interested in finding the three highest numbers in sequence he encounters. These numbers are crucial for his research, representing significant values within the sequence. To assist Mr. Ali, you are required to write a Java program that reads a sequence of integer numbers and determines the three highest numbers in the sequence. **Do not use Arrays to solve this problem.**

Sample Run

Input: 3 5 1 8 9 5 6 50 43 0

Output: Three highest Numbers: 50 > 43 > 9

Question# 3:

(6 Marks)

CUI has started accepting online applications for admissions. For this purpose, the candidates are required to create an account by providing email and password. You have been asked to implement

the password strength checking functionality. The password is considered as a strong password, if it contains at least one digit, one uppercase character, and has a minimum length of 8 characters.

The password checking functionality should repeatedly ask the user for password until a correct password as per above requirements is provided.

Question# 4:

(10 Marks)

You are required to create an application that can compute **square root of exponential function**. The exponential function for a value of x is calculated as:

$$e^x = \sum_{k=1}^N \frac{x^k}{k!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots + \frac{x^N}{N!}$$

You are required to create four methods for solving this:

a. Main:

Asks the user for the values of 'x' and 'N', where, x is the variable for which exponential is calculated and N is the number of iterations. After verification of both values as positive, the exponent calculation function should be called.

b. Exponential Calculation

Calculates the exponent according to the equation given in the question.

c. Factorial

The factorial of a number is the product of all positive integers from 1 to that number. It is calculated as follows:

$$N! = N \times (N - 1) \times (N - 2) \times \dots \times 2 \times 1$$

d. SquareRoot

Square root of a number 'n', can be approximated by repeatedly performing a calculation using the following formula:

$$\text{nextGuess} = (\text{lastGuess} + n / \text{lastGuess}) / 2$$

When nextGuess and lastGuess are almost identical, nextGuess is the approximated square root. The initial guess can be any positive value (e.g., 1). This value will be the starting value for lastGuess. If the difference between nextGuess and lastGuess is less than a very small number, such as 0.0001, you can claim that nextGuess is the approximated square root of n . If not, nextGuess becomes lastGuess and the approximation process continues.