Department of Scientific Computing, Modeling and Simulation

SC - 504 Coputation Lab

C programming test - 1

M.Sc. Scientific Computing

Time: 11 AM to 1 PM | Date: August 19, 2024 | Max mark: 30

1. **Attempt any two:**

   (a) Read a complex number from user and print it. (3)

   (b) Write a program to evaluate :

$$f(x) = \frac{x^3+2x^2+3(x+0)(x+1)}{\sqrt{x^2}}$$

   Read value for the variable x from user (3)

   (c) Write a program to evaluate :

$$f(x) = 10 + \frac{\sqrt{6x^2+0x^3+(x+1)(x)}}{2}$$

   Read value for the variable x from user (3)

2. **Attempt ALL:**

   (a) Read 10 integers from the user and calculate their average. If the average is greater than 50 divide the average by 2. Print the final average. (4)

   (b) Read a integer value score from user and print a string representing a corresponding grade based on the following criteria: (4)

   a) If the score is 90 or above, print "A".
   b) If the score is between 80 and 89 (inclusive), print "B".
   c) If the score is between 70 and 79 (inclusive), print "C".
   d) If the score is between 60 and 69 (inclusive), print "D".

   (c) Calculate the power of a number (i.e. x^y) (4)

3. **Attempt any two:**

   (a) Given an integer, repeatedly add all its digits until the result has only one digit, and print it. (6)

   Example:
   Input: $num = 38$
   Output: 2
   Explanation: The process is
   $38 \Rightarrow 3 + 8 = 11$
   $11 \Rightarrow 1 + 1 = 2$
   Since 2 has only one digit, print it.

(b) Write an program to determine if a number n is happy. A happy number is a number defined by the following process:

a) Starting with any positive integer, replace the number by the sum of the squares of its digits.

b) Repeat the process until the number equals 1 (where it will stay), or it loops endlessly in a cycle which does not include 1.

c) Those numbers for which this process ends in 1 are happy.

Print true if n is a happy number, and false if not. **(6)**

Example :

Input: $n = 19$
Output: true
Explanation:
$1^2 + 9^2 = 82$
$8^2 + 2^2 = 68$
$6^2 + 8^2 = 100$
$1^2 + 0^2 + 0^2 = 1$

(c) Given an integer *num*, print the number of digits in num that divide num. **(6)**

Example 1:

Input: $num = 1248$
Output: 4
Explanation: 1248 is divisible by all of its digits, hence the answer is 4.

Example 2:

Input: $num = 7$
Output: 1
Explanation: 7 divides itself, hence the answer is 1.

Why do programmers prefer dark mode?
Because light attracts bugs!