INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
DEPARTMENT OF MATHEMATICS AND STATISTICS

MA522M-Data Science Programming Laboratory

Exercise-3 | Duration: 120 Minutes | P1 Slot | 15:00-17:00

20 January 2025 | Practical | 3 Marks

Answer All Questions. Usage of Internet is not Allowed

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1. Get three integer input from the user. Calculate the smallest of three integers (Only if and nested if is allowed) [0.25]

2. Get 4 real numbers, and find the smallest and the greatest of those four numbers. Calculate the difference between the smallest and the greatest. (use if and elif, no sorting is allowed) [0.5]

3. Find all prime numbers between 1 to n. Accept n as an input from the user. [0.5]

4. Let n be a positive integer. Let D be the list of its proper divisors. For example

   - If $n = 10$, then $D = \{1, 2, 5\}$.
   - If $n = 12$, then $D = \{1, 2, 3, 4, 6\}$.
   - If $n = 28$, then $D = \{1, 2, 4, 7, 14\}$

   Let

   $$\sigma(n) = \sum_{k \in D} k$$

   For example, $\sigma(10) = 8, \sigma(12) = 16, \sigma(28) = 28$.

   - A number is said to be deficient, if $\sigma(n) < n$. Example: 10.
   - A number is said to be abundant, if $\sigma(n) > n$. Example: 12
   - A number is said to be perfect, if $\sigma(n) = n$. Example: 28

   Write a Python program to classify numbers between 1 and 100 as deficient, abundant and perfect. [0.5]

5. Calculate the sum of entries of an $n \times n$ matrix without their diagonal and anti-diagonal entries. Test it for a matrix with all constant entries. [0.5]

6. Calculate the sum of the fourth power of first n natural numbers, if it is divisible by 7. Check whether the final sum is divisible by 13. Receive n as an input. [0.25]

7. Get an input of a positive or negative integer until zero is given. Terminate the program when the input is zero. Find the minimum, maximum and average of all numbers fed as input (Use for loop and break statement). [0.25]

8. Calculate the factorial of a non-negative integer (using a while loop). [0.25]