MCA Semester-I Term-end Examinations 2021-22

CSC115: Lab-I (APD)

Attempt two programs assigned to each student/examinee out of the following:

1. Write a program that reads in a set of n single digits and converts them into a single decimal integer. [Viz; Suppose input is digits 2,3,5,7 the output should be the integer 2357]

2. Write two C functions in the same program to do the following:

   Take as input a positive integer 'n' from the user, where n>=0.

   (a) Compute the factorial of 'n' in a iterative fashion.

   (b) Compute the factorial of 'n' in a recursive fashion.

3. Write two C functions in the same program to do the following.

   Take as input a positive integer 'n' from the user.

   (a) Compute the Fibonacci number corresponding to 'n' in a iterative fashion.

   (b) Compute the Fibonacci number corresponding to 'n' in a recursive fashion.

4. Write a program to compute the 1 /n!

5. Write a program to evaluate the function sin(x) as defined by the series expansion,

   $\sin(x) = x/1! - x^3/3! + x^5/5! - x^7/7! +$ ---- upto n terms

6. Write a program to find square root of given number n using a user-defined function.

7. Given two positive non-zero integers n and m, write a program for finding their greatest common devisor (gcd).

8. Write a program to reverse the digits of a given number. Also check whether the number is a palindrome or not.

9. Write a program to reverse a given string. Also check whether the string is a palindrome or not.

10. Write a program to convert a given decimal number into binary, octal and hexadecimal equivalents.

11. Write a program to find the duplicate characters in a given text if any and their frequencies.

12. Write a program to search a substring in a given string if it is present.

13. Write a program to calculate total marks and percentage of a student for 5 subjects where marks of each subject should be greater than minimum pass marks.

14. Write a program to display the largest of given N numbers.

15. Write a program to reverse the elements stored in an array of N integers. Also find how many exchanges are required in general for both even and odd array sizes.

16. Write a program to compute all the prime factors of a given integer which are not the multiples of 2, 3 and 5 as divisors.

17. Write program to generate a uniform set of pseudo-random numbers using linear-congruential method. Successive members of the linear congruential sequence (x) are generated using the expression:

$x_{n+1} = (ax_n + b) \bmod m$ for n >= 0, where the parameters a, b, m, x_0 must be chosen in advance according to certain criteria. The parameters a, b and m are referred to as multiplier, increment and modulus respectively and their values should be greater than or equal to zero and m should be greater than x_0, a and b. Check the uniformity of the distribution produced by the linear-congruential method for m = 4096 by accumulating random numbers in blocks of 64 in the range 0->4095 (e.g. the first block is 0->63).

18. Given some integer x, write a program to compute the value of x^n that may exceed the computer's integer representation limit, where n is positive number considerably greater than 1.

19. Write a program to find all the prime numbers lying between 100 and 200 using user-defined function. Also find the smallest and largest primes in this range.

20. Write a program to implement the algorithm to search an element in an array of N elements using *linear search* and *binary search* and determine the time to search the element in each case.

21. Write a program to add and multiply two given matrices of specified dimensions.

22. Write a program to find the maximum and minimum values stored in an array of N integers and how many times they both occur in the array.

23. Write a program to remove the duplicate values from an array of N elements. Also find what difference it will make in terms of no. of comparisons and data movements if the array is ordered or unordered. It can be assumed that there are no negative array elements.

24. Write a program to find the frequency of each element stored in an array of N elements having values in the range of 1 to 100.

25. Write a program that rearranges the elements of an array so that all those originally stored at odd suffixes are placed before those at even suffixes. For example, the set

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

would be transformed to

| 1 | 3 | 5 | 7 | 2 | 4 | 6 | 8 |

26. Write a program that partitions (decomposes) an array of N integers into two subarrays- one containing all the odd values and another having all the even values.

27. Write a program to merge the elements of the two given arrays of N integers that may be ordered or unordered into a third array which should be ordered.

28. Write a program to implement *Quick sort* on an unsorted array of N elements and determine the time to sort the elements. Choose the element at middle as the pivot element.

29. Write a program to rearrange the elements in an array of N elements so that they appear in order using *insertion sort.* Also check for the duplicate values in the program.

30. Write a program to sort an array of n elements using S*election sort* and determine the time to sort the elements. The program should remove duplicates during the sorting process*.*

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