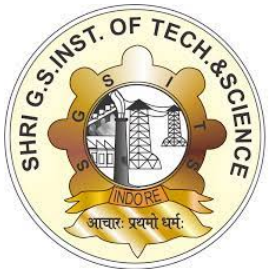

Shri G. S. Institute of Technology and Science, Indore

Department of Computer Engineering

CO34563 - Assignment - 1 (Warm-up assignment)

Course Instructor: Surendra Gupta (sgupta@sgsits.ac.in)

March 9, 2023

---

1. For the following problems, write **pseudocode** solutions. After that implement the algorithms in any programming language and draw a graph beetween size of input and time taken of yours algorithm. and also mention the growth rate of the algorithms.

   Problem 1: Write a C program to take Input 5 integers through keyboard, and display the second largest number.

   Problem 2: Write a C program to take Input a 4-digit integer through keyboard and check if it's divisible by 2, 3, 4, and 12.

   Problem 3: Write a C program to take Input a 4-digit integer through keyboard, print the sum of product of even position digits and odd position digits. For example, if the integer is 2345, then the sum of the product will be 2*4+3*5=23.

   Problem 4: Fibonacci numbers are the numbers in the following integer sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21 ... By definition, the first two Fibonacci numbers are 0 and 1, and each subsequent number is the sum of the previous two numbers. Write a program to compute nth number in this series for given input n.

   Problem 5: Print a triangle of '*'s of height 'r' rows. Now modify your program to print it upside down of given size 'r', where r represents the no. of rows in the triangle.

   Problem 6: Implement a C program that finds all the numbers between 01 and 1000 such that the number itself minus the number reversed is equal to the sum of its digits. For example: 54 is such a number because 54-45 (which is 9) is same as the sum of its digits (5+4 = 9).

   Problem 7: User provides two unsorted 1-D arrays of sizes m and n, write a C program that merges the two into another 1-D array of size m + n such that this new array becomes sorted. The sizes m and n and values in the arrays are also provided by user.

   Problem 8: Write a C program that take 2 integer sets A[] and b[] as input and prints results of following set operations:

   (a) A union B (Write function setunion())

   (b) A intersection B (Write function setintersection())

   (c) A-B and B-A (Write function setdifference())

   Problem 9: Write a function (function name: distance) to compute the distance between two points and use it to develop another function (function name: area) that will compute the area of the triangle whose vertices are A(x1, y1), B(x2, y2), and C(x3, y3). Use these to develop a function functions (function name: tritest) which returns a value 1 if the point (x, y) is inside the triangle ABC, otherwise a value 0 for N points, where N points are entered through the keyboard.

   Problem 10: An array of integers is said to be a straight-K, if it contains K elements that are K consecutive numbers. For example, the array 6, 1, 9, 5, 7, 15, 8 is a straight because it contains 5, 6, 7, 8, and 9 for K=5. Write a program to finds the maximum value of K for the given number of integers.

   Problem 11: Write a program to find the factorial of the given number ($1 \leq n \leq 10{,}000{,}000{,}000$).

Problem 12: An array of integers is said to be a straight-K, if it contains K elements that are K consecutive numbers. For example, the array 6, 1, 9, 5, 7, 15, 8 is a straight because it contains 5, 6, 7, 8, and 9 for K=5. Write a program to finds the maximum value of K for the given number of integers.

Problem 13: Write a C program to print the all possible circular rotation of elements of array. For example if input array=3,5,2,6,1 then output=52613, 26135, 61352, 13526 and 35261.

Problem 14: A powerful number is a positive integer m such that for every prime number p dividing m, p2 also divides m. Equivalently, a powerful number is the product of a square and a cube, that is, a number m of the form m = a2b3, where a and b are positive integers. For example the 21600 decimal number a powerful number because 21600= 25x33x52=102x63. Write a function to check whether a given number is a powerful number or not.

Problem 15: Consider a positive integer n of type int. The next higher permutation of n is the smallest integer greater than n which is formed by permuting the digits of n. For example, the next higher permutation for n=1209861 is 1210689, the next higher permutation for n=1421731 is 1423117. Note that next higher permutation may not exist for every number. Write a program to find the next higher permutation of the given number.

Problem 16: Write a program to display the given number after eliminating the duplicate digits from it. For example: for a given number 245265 display the number 2456.

Problem 17: 2. A number n is called left trunckable prime if n and all numbers obtained by successively removing its left most digits are prime.(Similarly right truncatable prime is defined) Ex 313 is a left truncatable prime – 313 is prime, 13 is prime, 3 is prime. 313 is also right truncatable – 313 is prime, 31 is prime, 3 is prime. Write a C program using prime() function, which takes a number n as input and then tells whether it is left truncatable, right truncatable or both.

Problem 18: 5. Write a program to multiply two arrays of integers. For example a[]=1,2,3,4,5 and b[]=9,8,7,6 then output is c[]=1,2,1,9,1,9,2,2,0.

Problem 19: Write a function void partition (int a[], int left, int right)which selects the first element in the array as pivot, rearranges the array elements, such that the pivot element goes to the new position middle between left and right, so that all left side elements are less then middle element and all right side elements are grater then middle element.

Problem 20: A number is circular prime if it is prime and all its cyclic rotations are also prime. e.g. The number 1193 is a circular prime number because it is prime and all its cyclic rotations 1931, 9311, 3119 are prime. Write a program that takes an integer n as input and prints whether it is circular prime or not. Your program has to work for all values of n which can be stored in data type int.