National Institute of Technology Calicut
Department of Computer Science and Engineering
B. Tech. (CSE) – Third Semester
CS2092D: Programming Laboratory
Assignment – 2 (Part-A)

Submission deadline (on or before):

1st August 2018, 11:30:00 PM

Policies for Submission and Evaluation

You must submit your assignment in the moodle (Eduserver) course page, on or before the submission deadline. Also, ensure that your programs in the assignment must compile and execute without errors in Athena server. During evaluation your uploaded programs will be checked in Athena server only. Failure to execute programs in the assignment without compilation errors may lead to zero marks for that program.

Your submission will also be tested for plagiarism, by automated tools. In case your code fails to pass the test, you will be straightaway awarded zero marks for this assignment and considered by the examiner for awarding F grade in the course. Detection of ANY malpractice regarding the lab course will also lead to awarding an F grade.

Naming Conventions for Submission

Submit a single ZIP (.zip) file (do not submit in any other archived formats like .rar or .tar.gz). The name of this file must be ASSG<NUMBER>_<ROLLNO>_<FIRST-NAME>.zip (For example: ASSG2A_BxxyyyyCS_LAXMAN.zip). DO NOT add any other files (like temporary files, input files, etc.) except your source code, into the zip archive.

The source codes must be named as ASSG<NUMBER>_<ROLLNO>_<FIRST-NAME>_<PROGRAM-NUMBER>.<extension> (For example: ASSG2A_BxxyyyyCS_LAXMAN_1.c).

If you do not conform to the above naming conventions, your submission might not be recognized by some automated tools, and hence will lead to a score of 0 for the submission. So, make sure that you follow the naming conventions.

Standard of Conduct

Violations of academic integrity will be severely penalized.

Each student is expected to adhere to high standards of ethical conduct, especially those related to cheating and plagiarism. Any submitted work MUST BE an individual effort. Any academic dishonesty will result in zero marks in the corresponding exam or evaluation and will be reported to the department council for record keeping and for permission to assign F grade in the course. The department policy on academic integrity can be found at: **http://cse.nitc.ac.in/sites/default/files/Academic-Integrity.pdf**.

General Instructions

- Programs should be written in C language and compiled using C compiler in Linux platform.
- Invalid input should be detected and suitable error messages should be generated.
- Sample inputs are just indicative.
- Please do the programs in your free time either from System Software Lab (SSL) / Network Systems Lab (NSL), when the lab is not used for regular lab hours or do the programs using your own computer. Even if the programs work in your own computer, there is a chance that they may not work properly in the computers in SSL / NSL, due to some compatibility issues of the C compiler or the machine. Hence, before the evaluation day, check that your programs are ready for execution in the computers in NSL/SSL.
- Evaluation of few random questions from the following questions will be conducted on **02, August 2018 (Thursday).**

Part-A: Functions, Parameter passing, and Recursion

1. Write a program to find the GCD (Greatest Common Divisor) of two integers using recursion. The GCD of two integers is the largest integer that can exactly divide both the integers without a remainder.

Input	Enter two integers:	366, 60
Output	GCD of 366 and 60:	6
Input	Enter two integers:	-10, 15
Output	GCD of -10 and 15:	5
Input	Enter two integers:	0, 15
Output	GCD of 0 and 15:	15

2. Write a program to convert a given binary number (base 2) to its equivalent decimal number (base 10) using function. For example, the decimal number corresponding to the binary number $(1011)_2$ is $1*2^0 + 1*2^1 + 0*2^2 + 1*2^3 = 11$

Input	Enter a binary number	: 110110111
Output	The equivalent decimal number	: 439

3. Given two matrices A (m1 rows and n1 columns) and B (m2 rows and n2 columns), write a program to perform addition and subtraction of matrices A and B. Print the original matrices A and B, their sum and difference. The program must include the following functions:

a) read (X, m, n): Function reads the elements of matrix X with ‘m’ rows and ‘n’ columns
b) print (X, m, n): Function prints the elements of the matrix X with ‘m’ rows and ‘n’ columns in matrix form
c) sum (A, B): Function calculates the sum of the matrices A and B and stores the sum in a matrix C and returns C
d) subtract (A, B): Function subtracts B from A and stores the result in a matrix D and returns D

Input	Enter the order of the matrix A	3 3
	Enter the order of the matrix B	3 3

Enter the elements of matrix A 1 4 5
6 7 8
4 8 9

Enter the elements of matrix B 3 6 7
8 4 2
1 5 3

Output Matrix A is 1 4 5
6 7 8
4 8 9

Matrix B is 3 6 7
8 4 2
1 5 3

Matrix C is 4 10 12
14 11 10
5 13 12

Matrix D is -2 -2 -2
-2 3 6
3 3 6

Input Enter the order of the matrix A 3 3
Enter the order of the matrix B 3 2

Enter the elements of matrix A 1 4 5
6 7 8
4 8 9

Enter the elements of matrix B 3 6
8 4
1 5

Output Matrix A is 1 4 5
6 7 8
4 8 9

Matrix B is 3 6
8 4
1 5

Matrix Addition is not possible
Matrix Subtraction is not possible.

4. Write a program to read three integers ‘n’, ‘x’, and ‘y’. Add all natural numbers below ‘n’ that are multiples of ‘x’ or ‘y’ and display the final sum using functions (Call by value).

Input Enter Value of n : 10
Enter Value of x : 3
Enter Value of y : 5

Output Multiples of 3 are : 3, 6, 9
Multiples of 5 are : 5
Total sum is : 23

5. Write a program to find the roots of a quadratic equation $ax^2 + bx + c= 0$. Print the roots (with a precision of three digits after the decimal point) along with the nature of roots. Nature of roots of a quadratic equation can be known from the discriminant $D = b^2-4ac$.

If $b^2-4ac > 0$, then roots are real and unequal
If $b^2-4ac = 0$, then roots are real and equal
If $b^2-4ac < 0$, then roots are imaginary

Print "No solution" if both 'a' and 'b' are zero. Print "Linear equation" if a = 0 but b ≠ 0.

Input	Enter a, b, c	: 0 2 3
Output	Linear equation	
	Roots	: 1.500
Input	Enter a, b, c	: 1 3 2
Output	Roots are real	
	Roots	: -1.000 and -2.000
Input	Enter a, b, c	: 2 6 9
Output	Roots are complex	
	Roots	: -1.500+1.500i and -1.500-1.500i
Input	Enter a, b, c	: 0 0 4
Output	No solution. a & b both zero	

6. Write a program that accepts (from the keyboard) a positive decimal fraction a (0 < a < 1) and prints its equivalent binary representation (print only first 4 bits of the binary representation). If the binary representation continues after four bits, then append the binary representation with"…"

Input	Enter a positive decimal fraction less than 1	: 0.875
Output	Binary equivalent of 0.875000	: 0.111
Input	Enter a positive decimal fraction less than 1	: -0.1
Output	Entered number is not a positive decimal fraction less than 1	
Input	Enter a positive decimal fraction less than 1	: 1.2
Output	Entered number is not a positive decimal fraction less than 1	
Input	Enter a positive decimal fraction less than 1	: 0.525
Output	Binary equivalent of 0.525000	: 0.1000...

7. Write a program to read an array of 'n' integers. Find the sum of all four-digits even numbers in the given array using function (Call by reference).

Input	Enter number of elements	: 8
	Enter the elements	: 109, 2015, 8, 423, 87,927, 7618, 1212
Output	The sum is	: 7618 + 1212 = 8830

8. Write a program to check whether a given number is a perfect number or not using functions. Perfect Number is a positive integer whose value is equal to the sum of it's proper positive divisors excluding the number itself. For e.g.: Number 6 is a Perfect Number where 6 = 1 + 2 + 3, Number 28 is a Perfect Number where 28 = 1 + 2 + 4 + 7 + 14.

Input Enter an integer number : 496
Output 496 is a Perfect Number.

Input Enter an integer number: : 695
Output 695 is not a Perfect Number.

9. Write a program to print first n Fibonacci numbers using recursion

Input Enter the number(n) = 2
Output Fibonacci series 0, 1

Input Enter the number(n) = 10
Output Fibonacci series 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

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