Indian Institute of Information Technology Sri City, Chittoor (An Institute of National Importance under An Act of Parliament)

Name: **DSA Lab** Duration: **3Hrs**

INSTRUCTIONS:

1. Please carefully read all questions and there is no choice.
2. Submit single .c file for the all the assignment problems (by using comments).
a. Name the file as follows: S2020xxxxx_A1.c for the solution for problems.

3. Do NOT zip. Just attach the .c files directly to your submission in common Google classroom.

Not following instructions leads to heavy penalty

PROBLEM INSTRUCTIONS:

1. For all problems write the solution as a function. You shall call the function from main.
2. All the arguments to the functions must be pointers

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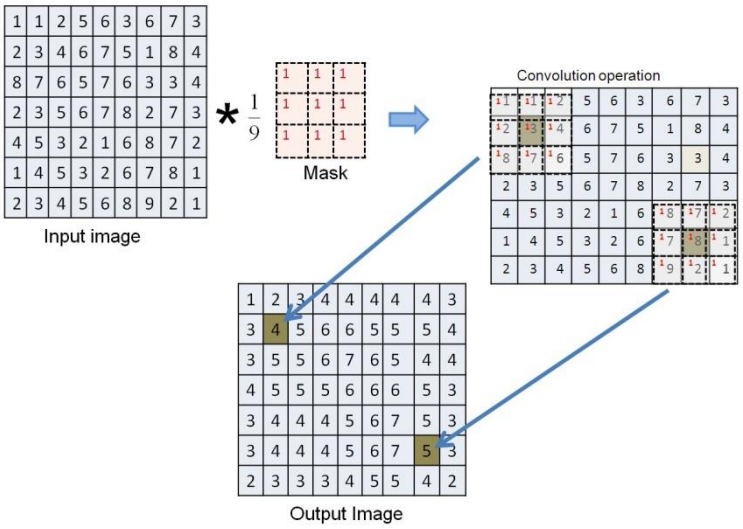
1) Write a C program to generate random n natural numbers between 1 to n. Search the number by asking the user to provide the search key using linear search, display the appropriate messages for the search results. Print the location of the element if found. Display the number of primitive operations were executed according to RAM model.
2) a. Write a program to determine if a positive integer, N, is prime.
   b. In terms of N, what is the worst-case running time of your program? (You should be able to do this in O(√N).
3) Write a program to find first n Fibonacci series using recursive function; identify the complexity of the function using recurrence relation.
   Note: The discussion of complexity of the program should be in comments at the beginning of the code.
4) Write a program to read the n X n square matrix which takes values between [0-255], and perform the following operations:
   a. Write a function to convolve the input matrix with the given below 3X3 filter matrix using dot product (element-wise multiplication) and generate the resultant matrix. Resultant matrix should be n-2Xn-2 size (as we ignoring the borders during convolution)

1/9	1/9	1/9
1/9	1/9	1/9
1/9	1/9	1/9

   Hint: Convolution Process: https://medium.com/@icecreamlabs/3x3-convolution-filters-a-popular-choice-75ab1c8b4da8
   Dot Product: https://i.stack.imgur.com/YDusp.png



b. Identify the complexity of the function.

i.

Note: The discussion of complexity of the program should be in comments at the beginning of the code.