

Shiv Nadar University
CSD101: Introduction to Computing and Programming
Lab #11
Pointers, structures

Max marks: 80

Due on/before: 22.00, 15-Nov-2021.

7-Nov-2021

1. Read two 2D compatible arrays $A_{m \times n}$ and $B_{n \times p}$ of floating point numbers and calculate the matrix product of $C_{m \times p} = A \times B$ using only pointers without using any index variables.

Define separate functions for reading and printing the arrays. Do the multiplication in the `main` function.

You should output all the three arrays A , B , C .

[10]

2. Let us define a **Random Circular Jump** (RCJ) as follows: Let S be a sequence of length n with distinct entries from 0 to $(n - 1)$ (in any order). Assume i is the starting index then the next index is given by $S[i]$. The RCJ ends when we are back at the starting index i . We also define the length of the RCJ as the number of jumps in the RCJ. If $i = S[i]$ then length is 0.

Here are a few examples. Let $n = 6$.

S	Start index	RCJ	Length	Remarks
(2, 0, 4, 5, 3, 1)	0	0 2 4 3 5 1 0	6	Length 6 for any start index
(2, 3, 4, 5, 0, 1)	1	1 3 5 1	3	
(0, 2, 3, 4, 5, 1)	0	0	0	$i == S[i]$
(0, 2, 3, 4, 5, 1)	2	2 3 4 5 1 2	5	
(0, 1, 2, 3, 4, 5)	$0 \leq i \leq 5$	i	0	Length 0 for any start index

Represent the sequence by a 1D array. Take as input n , the start index i , generate S randomly (you did random generation in lab 10) ensuring distinct entries between 0 and $(n - 1)$. Print out the sequence, start index, RCJ and length of the RCJ.

All array manipulations must be done using pointers.

[40]

3. Define the following structure: **Bank Account** with the following attributes: Name - a string of size at most 20, Account Number - a positive integer, Balance - a floating point value.

Read in an array of Accounts and sort them in decreasing order of balance.

You should print out first the original array of accounts and then the sorted array of accounts. In each case print one account per line.

Write separate functions to read, print and sort accounts (use any sorting method of your choice). Use only pointers for all array manipulations.

[30]