

60-141
Intro to Algorithms & Programming II Winter 2014

Lab #3: Arrays
(Due at the end of the lab period or beginning of the next)

Objective: Learn to handle 2D arrays.

Manipulating a 2D array:

1. Create a two dimensional array of size **M x N** to store integer values. Use **#define M 6** and **N 5** to start. (Using symbolic constants instead of hard coding the array sizes improves scalability).
2. Populate the array with random integer numbers between 15 and 75.
3. Print the array in a table format.
4. Use Linear Search to find if a number **n** is found in the array, where **n** is an integer between 15 and 75 entered by the user.
5. Apply a single LEFT shift operation to the array. LEFT shift means move every element one position to the LEFT; the first element becomes the last one, and the first element in each row moves up to become the last element in the previous row.

Example: Left shift of:

4 8 3 2
5 9 1 7

becomes:

8 3 2 5
9 1 7 4

6. Print the shifted array.

You can create an interactive menu for this program (call it **Lab3.c**) to fill the array with random numbers, search the array, left shift the array, print the array and quit.

Design and document the following functions (REQUIRED):

- **PrintArray2D()** -- to print the array.
- **PopulateRandom2D()** -- to populate the array with random numbers.
- **LinearSearch2D()** -- to search the array for a value.
- **LeftShift2D()** -- to left shift the array.

Each one of the functions above accepts a 2D array as a parameter, along with any additional parameters that you may find necessary. The return types of the functions are also your choice. Do NOT use global variables in this program.

EVALUATION:

You need to show your instructor the complete programs at the end of this lab, or at the beginning of your next lab. The marks you will receive for this lab are made of two parts: Lab work marks 8 and **attendance marks 2. Total 10 marks.**

Lab Work Mark: You will be evaluated based on your solutions for the problems based on the following scheme:

0 mark = No work done.

2 mark = Incomplete code / does not compile, with no/invalid documentation

4 marks = Complete running program with no/invalid documentation

6 marks = Incomplete code / does not compile, with proper documentation

8 marks = Complete running program with proper documentation

IMPORTANT:

ASK QUESTIONS IF YOU GET STUCK, BUT DO YOUR OWN CODE. ANY CODE SUSPECTED TO BE SIMILAR TO ANOTHER SUBMISSION WILL CAUSE BOTH SUBMISSIONS TO RECEIVE A ZERO MARK ON ALL LABS AND BE REPORTED FOR PLAGIARISM