

NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES ISLAMABAD

Object Oriented Programming (SE) Spring 2025 ASSIGNMENT # 1

Due Date: March 07, 2025

Instructions

Submission: Combine all your work in one .zip file. Use proper naming convention for your submission file. Name the .zip file as **SECTION_ROLL-NUM_01.zip** (e.g. **A_20i0412_01.zip**). Your zip file should not contain any folders or subfolders. It should only contain .cpp files for each question, e.g. Q1.cpp, Q2.cpp, ..., Q8.cpp. Submit .zip file on Google Classroom within the deadline. Failure to submit according to the above format would result in **25% marks deduction**. Submissions on the email will not be accepted.

Plagiarism: Plagiarism cases will be dealt with strictly. If found plagiarized, both the involved parties will be awarded zero marks in this assignment, all the remaining assignments, or even an **F grade** in the course. Copying from the internet is the easiest way to get caught!

Deadline: The deadline to submit the assignment is **7th of March, 2025**. Late submission with marks deduction will be accepted according to the course policy shared earlier. Correct and timely submission of the assignment is the responsibility of every student; hence no relaxation will be given to anyone.

Important Note: Implement the main function for all questions. Evaluation will be done on the basis of main function.

Comments: Comment your code properly. Write your name and roll number (as a block comment) at the beginning of the solution to each problem.

Tip:

- *You must do proper allocation and deallocation of the memory where necessary.*
- All programs must be generic.
- For timely completion of the assignment, start as early as possible.

Note: Follow the given instructions to the letter, failing to do so will result in a zero

Question # 1:-[20 Marks]

Write a C++ program using a dynamic array (or arrays) to assign passengers seats in a Bus and your program will ask the user how many rows the Bus has and will handle that many rows.

(Assume the Bus does not always have the same rows).

Expected output: Assume a small Bus with seat numbering as follows:1 A B C D

2 A B C D

3 A B C D

4 A B C D

5 A B C D

6 A B C D

7 A B C D

8 A B C D

9 A B C D

10 A B C D

The program should display the seat pattern, with an X marking the seats already assigned. For example, after seats 1A, 2B, and 4C are taken, the display should look like this:

1 X B C D

2 A X C D

3 A B C D

4 A B X D

5 A B C D

6 A B C D

7 A B C D

8 A B C D

9 A B C D

10 A B C D

After displaying the seats available, the program prompts for the seat desired, the user types in a seat, and then the display of available seats is updated. This continues until all seats are filled or until the user signals that the program should end. If the user types in a seat that is already assigned, the program should say that the seat is occupied and ask for another choice.

Question # 2:- [Total 20 marks]

Write a C++ program using dynamic arrays that allows the user to enter the last names of the candidates in a local election and the number of votes received by each candidate. The program must ask the user for the number of candidates and then create the appropriate arrays to hold the data. The program should then output each candidate's name, the number of votes received, and the percentage of the total votes received by the candidate. Your program should also output the winner of the election.

Name of Candidate	Votes Received	% of Total Votes
Ali	5000	25.91
Imran	4000	20.73
Ahmad	6000	31.09
Ijaz	2500	12.95
Khan	1800	9.33
Total	19300	

The winner of the local election is Ahmad.

Question # 3:-[20 Marks]

Write a program that takes a three 2D pointer array and find the following by implementing the function for each of the following task:

1. Is the sum of any two arrays is equal to the 3rd array?
`void CheckEqualSum Arrays(int **A1, int **A2, int **A3);`
2. Is the difference of any two arrays is equal to the 3rd array?
`void CheckDifferentArrays(int **A1, int **A2, int **A3);`
3. Are there any equal arrays among these?
`void CheckEqualArrays(int **A1, int **A2, int **A3);`
4. Find the same rows in each array.
`void FindSameRows(int **A1, int **A2, int **A3);`
5. Rotate all three arrays up to 90 degrees in clockwise direction.
`void RotateArrays(int **A1, int **A2, int **A3);`

Note: You can only use the pointer notation in manipulation of the array.

Question # 4:- [Total 20 marks]

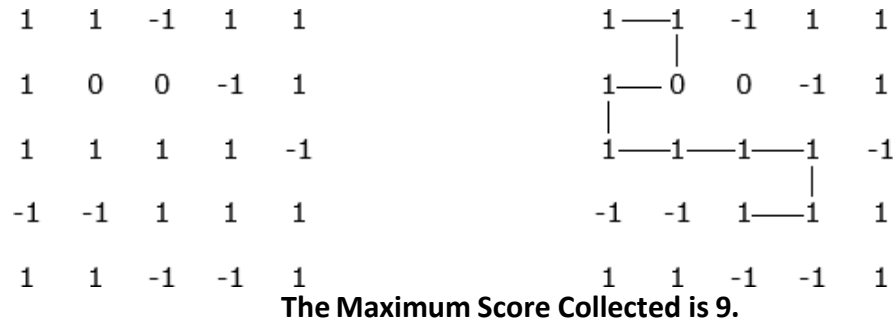
Given an $M \times N$ matrix where each cell can have a value of 1, 0, or -1, where -1 denotes an unsafe cell, collect the maximum number of one's starting from the first cell and by visiting only safe cells(i.e., 0 or 1). We can only go left or down if the row is odd; otherwise, we can only go right or down from the current cell. Write a program to count the calculate the maximum score collected.

Your Tasks:

1. Your program should ask the user total number of rows and columns of the 2D array(use only dynamic arrays). (3 points)
2. Fill the array with random values ranging from -1 to 1. (2 points)

3. Pass the array as a reference to the function. (3 points)
4. Function should return the total maximum score. Array should be accessed using pointer notation only. (12 points)

Example:



Question# 5:- [Total 20 marks]

Write a C++ program that outputs a histogram of student Marks for a Mid-term-1 Examination. The program should input each student's Marks as an integer and store the Marks in a dynamic array. Marks should be entered until the user enters -1 for marks. The program should then scan through the Dynamic array and compute the histogram. In computing the histogram, the minimum value of a marks is 0 but your program should determine the maximum value entered by the user. Then use a dynamic array to store and output the histogram.

For Example, if the input is:

80
60
80
70
60
50
50
50
-1

Then the output:

The frequency of 80's: 2
The frequency of 70's: 1
The frequency of 60's: 2
The frequency of 50's: 3

For Histogram: <https://www.mathsisfun.com/data/histograms.html>