

National University of Computer and Emerging Sciences



Lab # 10

For

Programming Fundamentals Lab

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FAST School of Computing

Instructions:

1. Make a word document with the convention “SECTION_Lab#_ROLLNO” and put all your source code and snapshots of its output in it.
2. Plagiarism is strictly prohibited, do not copy anything from internet, or any of your friend else your assignment will be marked 0.
3. Do not discuss solutions with one another.
4. Write the code with proper dialogues to improve the user interaction with your program.

You are required to use Nested loops for 2D-arrays, any question of 2-D arrays without nested loops will be marked 0.

Task 01:

Given a 2-Dimensional array of 10 X 10, find the largest element and smallest element in it. Use Nested Loops only. Take array elements input from user.

Task 02:

Write a C++ Program to Find the Transpose of a 7x7 Matrix. Use Nested Loops only.

Problem Description

The program takes a matrix and prints the transpose of the matrix. In a transpose matrix, rows become columns and vice versa. Take array elements input from user.

Task 03:

Write a C++ program that prints the diagonals of 8x8 matrix, find the sum of both diagonals, and interchange those diagonals and print the matrix. Take array elements input from user.

Hint: use Nested Loops

The Required output is as follows:

```
PS C:\Users\Hammad\Desktop> ./a
Simple Matrix:
7 2 3 4 5 6 1 4
1 7 3 4 5 6 4 8
1 2 7 4 5 4 7 8
1 2 3 7 4 6 7 8
1 2 3 4 7 6 7 8
1 2 4 4 5 7 7 8
1 4 3 4 5 6 7 8
4 2 3 4 5 6 7 7
Diagonal 1: 7 7 7 7 7 7 7 7
Sum of diagonal 1 is: 56
Diagonal 2: 4 4 4 4 4 4 4 4
sum of diagonal 2 is: 32
Matrix after interchanging Diagonals are:
4 2 3 4 5 6 1 7
1 4 3 4 5 6 7 8
1 2 4 4 5 7 7 8
1 2 3 4 7 6 7 8
1 2 3 7 4 6 7 8
1 2 7 4 5 4 7 8
1 7 3 4 5 6 4 8
7 2 3 4 5 6 7 4
PS C:\Users\Hammad\Desktop>
```

Task 04:

Write a program that can be used to assign seats for a commercial airplane. The airplane has 13 rows, with six seats in each row. Rows 1 and 2 are first class, rows 3 through 7 are business class, and rows 8 through 13 are economy class. Your program must prompt the user to enter the following information:

- Ticket type (first class, business class, or economy class)
- Desired seat

Output the seating plan in the following form:

	A	B	C	D	E	F
Row 1	*	*	X	*	X	X
Row 2	*	*	X	*	X	X
Row 3	*	*	X	X	*	X
Row 4	X	X	*	*	*	X
Row 5	*	*	X	*	X	*
Row 6	X	*	*	*	*	X
Row 7	X	*	X	*	X	*
Row 8	*	*	*	*	X	*
Row 9	*	*	X	*	*	*
Row 10	X	X	*	*	X	X
Row 11	*	*	X	*	*	X
Row 12	*	*	*	*	*	*
Row 13	X	*	*	*	X	*

Here, * indicates that the seat is available; X indicates that the seat is occupied. Make this a menu-driven program; show the user's choices and allow the user to make the appropriate choices.

Task 05:

When a message is transmitted in secret code over a transmission channel, it is usually sent as a sequence of bits, that is, 0s and 1s. Due to noise in the transmission channel, the transmitted message may become corrupted. That is, the message received at the destination is not the same as the message transmitted; some of the bits may have been changed.

There are several techniques to check the validity of the transmitted message at the destination. One technique is to transmit the same message twice. At the destination, both copies of the message are compared bit by bit. If the corresponding bits are the same, the message received is error-free.

Let's write a program to check whether the message received at the destination is error-free. For simplicity, assume that the secret code representing the message is a sequence of digits (0 to 9) and the maximum length of the message is 250 digits.

Also, the first number in the message is the length of the message.

For example, if the
secret code is:

7 9 2 7 8 3 5 6

then the actual message is 7 digits long, and it is transmitted twice.

The above message is transmitted as:

7 9 2 7 8 3 5 6 7 9 2 7 8 3 5 6

Input Sequence of numbers containing the secret code and its copy

Output The secret code, its copy, and a message—if the received code is errorfree—in the following form:

Code Digit Code Digit Copy

9 9

2 2

7 7

8 8

3 3

5 5

6 6

Message transmitted OK.

PROBLEM ANALYSIS AND ALGORITHM DESIGN

Because we have to compare the corresponding digits of the secret code and its copy, we first read the secret code and store it in an array. Then we read the first digit of the copy and compare it with the first digit of the secret code, and so on. If any of the corresponding digits are not the same, we indicate this fact by printing a message next to the digits. Because the maximum length of the message is 250, we use an array of 250 components. The first number in the secret code, and in the copy of the secret code, indicates the length of the code.

Best of luck