


National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	Computer Org, & Arch.	Course Code:	
	Degree Program:		Semester:	Fall 2024
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	Paper Date:	24 th October, 2024	Weight	
	Section:	E	Page(s):	
	Exam Type:	Mid-I		

Student : Name: _____ **Roll No.** _____ **Section:** _____

Instruction/Notes: Attempt all questions. Programmable calculators are allowed. Sharing of notes is prohibited.
 This is an open book and open notes Mid.
 Your code must be Generic except for the position of the matrix.

Question # 1: A user wants to create a calculator function for the following operations on the given matrices and display the result on the console successfully.

The operations needs to be performed:

1. Multiplication of Matrices.
2. Determinant of Matrix.
3. Transpose of Matrix.

Given Matrices: $A = \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 \\ 3 & 6 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

Write a program the has the following functionalities:

- a. A Subroutine that will perform the multiplication of the Matrix B and C (BxC) and stored the result In the memory to display later. Orders of Matrix matters in the multiplication keep that in mind. [7]
- b. A Subroutine that performs the Determinant of Matrix C Det(C) and stored the result In the memory to display later. [7]
- c. A Subroutine that performs the Transpose of Matric A. [4]
- d. Display the results of all the above parts one after another as follow. [10]

The Given Matrices are $A = \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 \\ 3 & 6 \end{pmatrix}$ $C = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

$B \times C = \begin{pmatrix} 9 & 12 & 15 \\ 18 & 21 & 27 \end{pmatrix}$

$\text{Det}(C) = 0$

$A^T = \begin{pmatrix} 3 & 2 \\ 5 & 4 \end{pmatrix}$

Hint : The multiplication of matrix is as follow :

$$B \times C = \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} \times \begin{pmatrix} c_{11} & c_{12} & c_{13} \\ c_{21} & c_{22} & c_{23} \end{pmatrix} = \begin{pmatrix} b_{11}c_{11} + b_{12}c_{21} & b_{11}c_{12} + b_{12}c_{22} & b_{11}c_{13} + b_{12}c_{23} \\ b_{21}c_{11} + b_{22}c_{21} & b_{21}c_{12} + b_{22}c_{22} & b_{21}c_{13} + b_{22}c_{23} \end{pmatrix}$$

$$\det(C) = c_{11}(c_{22}c_{33} - c_{23}c_{32}) - c_{12}(c_{21}c_{33} - c_{23}c_{31}) + c_{13}(c_{21}c_{32} - c_{22}c_{31})$$

$$A^T = \begin{pmatrix} a_{11} & a_{21} \\ a_{12} & a_{22} \end{pmatrix}$$

Question #2[8]: Write a program that will display a hexagon shape on the screen and transverse a moving star (*) through the whole shape after displaying the original one .

The shape is as follow:

