

CEN 134 Hw (C int multi dimension array operations)

Problem . A nxn square matrix can be represented by a two-dimensional array in C. Write a program which reads two nxn square matrices from user each element one by one. Then do the following operations:

- a) Write a function to take the transpose of each matrix and print the transpose of each matrix to the screen. The prototype can be as follows:

```
void transpose(int a[][],int n,int c[][])
```

a[][] is the source array (nxn matrix)

c[][] is the destination array (nxn matrix). After this function is called c array should store the transpose of a matrix.

The transpose definition is given as follows [Reference 1]:

Transpose of a Matrix

A matrix which is formed by turning all the rows of a given matrix into columns and vice-versa. The transpose of matrix A is written A^T.

$$\text{If } A = \begin{bmatrix} 69 & 81 & 76 \\ 83 & 79 & 65 \\ 75 & 83 & 71 \end{bmatrix}$$
$$A' = \begin{bmatrix} 69 & 83 & 75 \\ 81 & 79 & 83 \\ 76 & 65 & 71 \end{bmatrix}$$

- b) Write a function to add two square matrices. The prototype can be as follows:

```
void add_matrix(int a[][],int n,int b[][],int c[][])
```

a[][] is the first source array (nxn matrix)

b[][] is the second source array (nxn matrix)

c[][] is the destination array (nxn matrix). After this function is called c array should store the addition value.

The addition of a matrix is given as follows [Reference 2]:

Two matrices A and B can be added or subtracted if and only if their dimensions are the same (i.e. both matrices have the same number of rows and columns. Take:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 0 & 2 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 2 & 1 & 2 \\ 1 & 0 & 3 \end{pmatrix}$$

Addition

If A and B above are matrices of the same type then the sum is found by adding the corresponding elements $a_{ij} + b_{ij}$.

Here is an example of adding A and B together.

$$A + B = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 0 & 2 \end{pmatrix} + \begin{pmatrix} 2 & 1 & 2 \\ 1 & 0 & 3 \end{pmatrix} = \begin{pmatrix} 3 & 3 & 5 \\ 2 & 0 & 5 \end{pmatrix}$$

References

1. http://www.mathwords.com/t/transpose_of_a_matrix.htm
2. <http://www.maths.surrey.ac.uk/explore/emmaspages/option1.html>

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