INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE – 247 667

(Autumn Semester 2018 – 19)

Fundamentals of Object Oriented Programming (CSN 103) **Assignment 3**

---

1. Ten numbers are entered from the keyboard into an array. The number to be searched is entered through the keyboard by the user. Write a program to find if the number to be searched is present in the array and if it is present, display the number of times it appears in the array.

2. Ten numbers are entered from the keyboard into an array. Write a program to find out how many of them are positive, how many are negative, how many are even and how many are odd.

3. Write a program to copy the contents of one array into another in the reverse order. The program should take double type values from the keyboard.

4. WAP for 5 × 5 matrix (a) entered through the keyboard (b) initialized in the program and stored in a 2-dimensional array mat[5][5]. Write a program to obtain the Determinant values of this matrix

5. Given two matrices A and B find its product using JAVA where A and B are *Cartan* matrices.

   A *Cartan* matrix is a square integer matrix who elements **($A_{i,j}$)** satisfy the following conditions.

   - $A_{i,j}$ is an integer, one of belongs to {-3, -2, -1, 0, 2}.
   - $A_{i,j} = 2$ the diagonal entries are all 2.
   - $A_{i,j} \leq 0$ off of the diagonal.
   - $A_{i,j} = 0$ iff $A_{j,i} = 0$.

   More about *Cartan* matrix can be found in
   http://mathworld.wolfram.com/CartanMatrix.html

6. WAP to check whether given matrix is Upper Triangular or not.

7. WAP to find the maximum element of a given matrix.

8. WAP to find the non overlapping sub-matrix of the given matrix of given order. If the given matrix is *A* and order of sub-matrix is 2 then

$$A = \begin{bmatrix} 1 & 3 & 7 & 8 \\ 6 & 5 & 3 & 2 \\ 9 & 7 & 8 & 1 \\ 0 & 7 & 0 & 6 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 3 \\ 6 & 5 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} 9 & 7 \\ 0 & 7 \end{bmatrix} \begin{bmatrix} 8 & 1 \\ 0 & 6 \end{bmatrix}$$

9. Write and test the function that rotate 90 and 180 degrees clockwise a two dimensional square array of integers.