

**B.TECH. (2020-24)**  
**Artificial Intelligence**

Lab File  
on  
**BASIC SIMULATION LAB**  
**[ES204]**



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# EXPERIMENT- 1

## AIM

- (A) Creating a One-Dimensional Array (Row / Column Vector)
- (B) Creating a Two-Dimensional Array (Matrix of given size)
- (C) Performing Arithmetic Operations - Addition, Subtraction, Multiplication and Exponentiation
- (D) Performing Matrix operations - Inverse, Transpose and Rank.

## SOFTWARE USED

Octave Online - <https://octave-online.net/>

## THEORY

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

MATLAB is an interactive system whose basic data element is an array that does not require dimensioning.

MATLAB is an abbreviation for "**MAT**rix **LAB**oratory." While other programming languages mostly work with numbers one at a time, MATLAB is designed to operate primarily on whole matrices and arrays.

All MATLAB variables are multidimensional arrays, no matter what type of data. A matrix is a two-dimensional array often used for linear algebra.

### (I) Creating a One-Dimensional Array (Row / Column Vector)

To create a 1D Array, you need to assign a list of numbers separated with comma (,) or space ( ), to any variable say (A) for a row vector or separated with semi-colon (;) for a column vector.

For instance, to create an array with four elements in a single row, separate the elements with either a comma (,) or a space.

```
A = [1 2 3 4]
```

This type of array is a row vector.

To create a column vector with 3 elements, separate the (row) elements with semicolons.

```
B = [1; 2; 7]
```

### (II) Creating a Two-Dimensional Array (Matrix of given size)

To create a 2D array or matrix of given size (say 3x3) that has multiple rows, separate the rows with semicolons.

```
C = [1 3 5; 2 4 6; 7 8 10]
```

### (III) Performing Arithmetic Operations - Addition, Subtraction, Multiplication and Exponentiation

MATLAB allows you to process all the values in a matrix using a single arithmetic operator or function.

Consider that A and B are two 3x3 matrices,

1. **Addition:** Using operator (+) as such  $C = A + B$ , adds arrays A and B by adding corresponding elements. If one input is a string array, then plus appends the corresponding elements as strings. The sizes of A and B must be the same or be compatible.