###### University of Dhaka

#### Department of Electrical and Electronic Engineering

EEE-3102: Numerical Technique Laboratory

Section: A

Class Roll: JN-19; SH-11

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Lab-1: Study on basic matrix operations using Matlab.

**Instruction:** Use the concept on matrix operations in Matlab tutorial for this Lab.

**Representation of Matrix in Matlab:**

Consider two matrices M and N given below

 

In Matlab, we can represent matrix A in an m-file using the following command

M=[1 2 -2;3 -1 5;2 3 1];

Similarly, we can represent matrix B as given below

N=[3 -1 2;5 1 -2;-1 4 1]

**Table-1: Matrix Operations on M and/or N**

|  |  |  |
| --- | --- | --- |
| **Operation** | **Description** | **How to apply** |
| + | Addition | M+N |
| - | Subtraction | M-N |
| \* | Matrix multiplication | M\*N |
| .\* | Element-by-Element multiplication | M.\*N |
| / | Matrix division | M/N |
| ./ | Element-by-Element multiplication | M./N |
| det | Determination of a matrix | Det(M) |
| inv | Inverse of a matrix | inv(M) |
| ‘ | Transpose of a matrix | M’ |
| diag | Gives the diagonal of a matrix | diag(M) |
| rank | Gives the rank of a matrix | Rank(M) |

**Observation-1**: Apply all the above operations listed in Table-1 for matrices M and N. For the operation on a single matrix, use matrix M. **Just observe the results. You don’t need to show the results in your lab report.**

**Observation-2**: For the matrix M, find

1. the first, middle and last elements of the 3rd column.
2. the first, middle and last elements of the 2nd row.
3. the whole of 3rd column and
4. the whole of 2nd row

**Just observe the results. You don’t need to show the results in your lab report.**

**Table-2: Additional command to generate typical matrices**

|  |  |
| --- | --- |
| **Command** | **Description** |
| A = randn(n) | A is an n×n **random matrix** having elements with random number. |
| A = ones(n) | A is an n×n **one-matrix** having all elements equal to 1. |
| A = zeros(n) | A is an n×n **zero-matrix** having all elements equal to 0. |
| A= eye(n) | A is an n×n **diagonal matrix** whose diagonal elements are 1, all other elements are 0. |
| A = magic(n) | A is an n×n **magic matrix** whose sum from any angle is the same. |

**Observation-3**: Implement all of the typical matrices of size 5×5. **Just observe the results. You don’t need to show the results in your lab report.**

**Exercise**

**E1**: Implement the following two matrices A and B in Matlab

 

1. Find the 3rd row named r3 of M1 where M1 is obtained by adding A and B. Put r3 below.

Ans:

r3 =

2 -6 4 9

1. Find the 4th column named c5 of M2 where M2 is obtained by element-by-element multiplication between A and B. Put c5 below.

Ans:

c5 =

1

4

18

16

1. Find the 4th element in the 2nd column named e42 of M3 where M3 is obtained by matrix multiplication between A and B. Put e42 below.

Ans:

e42 =

-19

1. Determine the inverse of matrix A and put it below.

ans =

-0.5208 0.5417 0.3229 0.8854

-0.3542 0.7083 0.2396 0.8021

0.4792 -0.4583 -0.1771 -0.6146

-0.7083 0.9167 0.4792 1.1042

1. Determine the transpose of matrix B and put it below.

ans =

3 -4 1 6

1 -5 -2 3

2 5 -3 1

-1 2 3 -4

1. Determine the rank of the matrix A and put it below.

ans =

4

1. Find the diagonal of matrix B and put it below.

ans =

3

-5

-3

-4

**E2**: Generate a 5×5 one-matrix named N1, a magic matrix N2, and a diagonal matrix N3. Find a matrix E after dividing N1 by N2, Use element-by element division for this purpose. Now, find a matrix F after performing matrix multiplication between N2 and N3.Now find a matrix G by adding matrices E and F. **You don’t need to put these results in your report**. Now find

1. the determinant d of matrix G and put the result below.

Ans:

d =

4.7375e+06

1. Find the 2nd element in the 4th row r24 of G and put the result below.

Ans:

r24 =

12.0833

**E3**: (a) write matlab code to generate a 3×3 random matrix and RUN it. RUN the code again. Are the results obtained from these two run same? Justify your answer.

Run1:

ans =

-0.3034 0.8884 -0.8095

0.2939 -1.1471 -2.9443

-0.7873 -1.0689 1.4384

Run2:

ans =

0.3252 -1.7115 0.3192

-0.7549 -0.1022 0.3129

1.3703 -0.2414 -0.8649

**Best of Luck !!!!**