# MATLAB

## MATRICES

1. Rank of the matrices or to chelk the consistency of the system of equations.

Code:

```
>> A = [ 2  1  4 ; 4  11  -1 ; 8  -3  2]

A =
     2     1     4
     4    11    -1
     8    -3     2

>> B = [12 ; 33 ; 20]

B =
    12
    33
    20

>> rank ([A,B]) == rank(A)

ans =
     1
```

2) LU decomposition method:-

```
>> a = [20  1 -2 ; 3  20  -1 ; 2 -3 20];
>> b = [17 ; -18 ; 25];
>> [l,u] = lu(a);
>>  y = linsolve(l,b);
>>  x = linsolve(u,y);
```

```
x =   1.0000
     -1.0000
      1.0000
```

3). Find the lower & upper triangular matrices (Modal matrix)

```
>> A = [1 2 3 ; 2 3 4 ; 1 2 3];
>> [L,U,P] = lu(A)
```

```
L =   1.0000        0        0
      0.5000   1.0000        0
      0.5000   1.0000   1.0000

U =   2.0000   3.0000   4.0000
           0   0.5000   1.0000
           0        0        0

P =        0        1        0
           1        0        0
           0        0        1
```

4) 3. Gauss Seidel iteration method.

```
>> A = [5 -1 1; 2 4 0; 1 1 5]

A =
     5    -1     1
     2     4     0
     1     1     5

>> B = [10; 12; -1]

B =
    10
    12
    -1

>> f1 = @(x,y,z)  (10+y-z)/5;
>> f2 = @(x,y,z)  (12-2*x)/4;
>> f3 = @(x,y,z)  (-1-x-y)/5;
>> x = 2;
>> y = 2;
>> z = -1;
>>
>> for i=1:3
   f1(x,y,z);
   f2(x,y,z);
   f3(x,y,z);
   x = f1(x,y,z);
   y = f2(x,y,z);
   z = f3(x,y,z);
   end
>> x

x = 2.5558
```

```
>> y

y =    1.7221

>> z

z =   -1.0556.
```

5) To find Eigen values and eigen vectors.

```
>> A = [6 -2 2; -2 -2 3; 2 -1 3];

A =
     6    -2     2
    -2    -2     3
     2    -1     3

>> [Evec Ev] = eig(A)

Evec =
   -0.8934    0.2132   -0.0778
    0.0490    0.9712    0.6228
   -0.4467    0.1066    0.7785

Ev =
    7.1098         0         0
         0   -2.1098         0
         0         0    2.0000.
```

6) To calculate / find ~~Modal matrix~~ and diagonalization of matrix.

```
>> a = [1 1 3 ; 1 5 1 ; 3 1 1];
>> [v, d] = eig(a)
```

```
v =  -0.7071    0.5774    0.4082
          0   -0.5774    0.8165
     0.7071    0.5774    0.4082

d =  -2.0000         0         0
          0    3.0000         0
          0         0    6.0000.
```

7) Guass elimination method

```
>> aug = [1 1 1 9; 1 -2 3 8; 2 1 -1 3]
>> aug = rref(aug);
>> a = aug(:, 1 : length(aug) -1);
>> b = aug(:, length(aug));
>> x = linsolve(a,b)
```

```
x =  2
     3
     4
```

8) Echelon form

```
>> A = [1 3 4 3 ; 3 9 12 3; 1 3 4 1];
>> Echelon_Form = rref(A)

Echelon_Form =

     1     3     4     0
     0     0     0     1
     0     0     0     0
```

9) Find the inverse of a matrix $[A^{-1}]$

```
>> X = [1 0 2 ; -1 5 0 ; 0 3 -9]
>> inv(X);
```