

# Assignment 1

DEEP - EE18BTECH11011

Download all c codes from

<https://github.com/Deep-2903/EE4013/tree/main/Assignment1/codes>

and latex-tikz codes from

<https://github.com/Deep-2903/EE4013/tree/main/Assignment1>

## 1 PROBLEM

Given the following matrix we have to find the

largest eigen value.  $M = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

## 2 SOLUTION

For this we can directly find the eigen value by using determinant method (Here I is identity matrix) i.e.,

$$|M - \lambda * I| = 0 \quad (2.0.1)$$

The above equation will give the following equation,

$$(\lambda - 3)(\lambda + 1)^3 = 0 \quad (2.0.2)$$

From this we can see that the roots are  $\lambda = 3$ ,  $\lambda = -1$ ,  $\lambda = -1$  and  $\lambda = -1$ . These are the eigen values and the biggest one is 3. So the answer is 3.

The other method is using Power method which is done in C language as well. The code for it is already shared at the start of this pdf. In this method we will be assuming a column vector

$$X = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} \text{ such that}$$

$$MX - \lambda X = 0 \quad (2.0.3)$$

After running the code accordingly we should get the largest eigen value as 3.