EE5609: Matrix Theory Assignment-2

M Pavan Manesh
EE20MTECH14017

***Abstract*—This document contains a solution for proving the determinant of the given matrix is zero.**

Download the python codes from

https://github.com/pavanmanesh/EE5609/blob/master/Assignment2/codes

and latex-tikz codes from

https://github.com/pavanmanesh/EE5609/tree/master/Assignment2

1 PROBLEM

$$\begin{vmatrix} 0 & a & -b \\ -a & 0 & c \\ b & c & 0 \end{vmatrix} = 0 \tag{1.0.1}$$

2 PROPERTIES

Properties used for solving this problem:

$$A\mathbf{x} = \mathbf{0} \tag{2.0.1}$$

A has a zero eigen value if x has a nontrivial solution.

3 SOLUTION

From (2.0.1),We can write x such that

$$\begin{pmatrix} 0 & a & -b \\ -a & 0 & -c \\ b & c & 0 \end{pmatrix} \begin{pmatrix} -c \\ b \\ a \end{pmatrix} = \mathbf{0} \tag{3.0.1}$$

So,one of the eigen value is equal to 0.say

$$\lambda_1 = 0 \tag{3.0.2}$$

We know that the

$$\det(A) = \lambda_1 \lambda_2 \cdots \lambda_n \tag{3.0.3}$$

From (3.0.2) and (3.0.3),

$$\det(A) = 0 \tag{3.0.4}$$