

EE5609 Assignment 3

Gaydhane Vaibhav Digraj
RollNo : AI20MTECH11002

Abstract—This assignment involves finding the matrix X by solving the equation.

The python code solution can be downloaded from,

https://github.com/Vaibhav11002/EE5609/blob/master/Assignment_3/Codes/assignment_3.ipynb

$$= 2a^2b^2c^2 \quad (2.0.2)$$

$$= 4a^2b^2c^2 \quad (2.0.3)$$

1 PROBLEM

Prove that,

$$\begin{vmatrix} a^2 & bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

2 SOLUTION

$$\begin{aligned} & \begin{vmatrix} a^2 & bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} \\ & \xrightarrow{R1 \leftarrow \frac{R1+R2+R3}{2}} 2 \begin{vmatrix} a^2 + ab & b^2 + bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} \\ & \xrightarrow{R1 \leftarrow R1 - R2} 2 \begin{vmatrix} 0 & bc & c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} \\ & \xrightarrow{C1 \leftarrow \frac{C1}{a}; C2 \leftarrow \frac{C2}{b}; C3 \leftarrow \frac{C3}{c}} 2abc \begin{vmatrix} 0 & c & c \\ a + b & b & a \\ b & b + c & c \end{vmatrix} \\ & \xrightarrow{R3 \leftarrow R3 - R1} 2abc \begin{vmatrix} 0 & c & c \\ a + b & b & a \\ b & b & 0 \end{vmatrix} \\ & \xrightarrow{R2 \leftarrow R2 - R3} 2abc \begin{vmatrix} 0 & c & c \\ a & 0 & a \\ b & b & 0 \end{vmatrix} \\ & \xrightarrow{R1 \leftarrow \frac{R1}{c}; R2 \leftarrow \frac{R2}{a}; R3 \leftarrow \frac{R3}{b}} 2a^2b^2c^2 \begin{vmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{vmatrix} \quad (2.0.1) \end{aligned}$$