Assignment 3

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Download all python codes from

https://github.com/jvinaykumar12/EE5609/tree/master/Assignment3

and latex codes from

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1 Problem

Solve the equation

$$\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix} = 0, a \neq 0. \tag{1.0.1}$$

2 Explanation

Given,

$$\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix} \tag{2.0.1}$$

$$\xleftrightarrow{R_1 \leftarrow R_1+R_2+R_3} \begin{vmatrix} 3x+a & 3x+a & 3x+a \\ x & x+a & x \\ x & x & x+a \end{vmatrix} \tag{2.0.2}$$

$$(3x+a)\begin{vmatrix} 1 & 1 & 1 \\ x & x+a & x \\ x & x & x+a \end{vmatrix} \tag{2.0.3}$$

$$\xleftrightarrow[C_3 \leftarrow C_3-C_1]{C_2 \leftarrow C_2-C_1} (3x+a)\begin{vmatrix} 1 & 0 & 0 \\ x & a & 0 \\ x & 0 & a \end{vmatrix} \tag{2.0.4}$$

$$= (3x+a)(a^2) \tag{2.0.5}$$

$$\tag{2.0.6}$$

Since a cannot be equal to zero, 3x+a should be zero for determinant to be zero

$$3x + a = 0 \tag{2.0.7}$$

$$a = -3x \tag{2.0.8}$$