Assignment 2

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1 QUESTION

(Section 3.10) 9. Show that $\begin{vmatrix} x & a & x+a \\ y & b & y+b \\ z & c & z+c \end{vmatrix} = 0$

2 EXPLANATION

Now we perform elementary row operations to tranform given matrix to echelon form.

$$\begin{pmatrix} x & a & x+a \\ y & b & y+b \\ z & c & z+c \end{pmatrix} \quad (2.0.1)$$

$$\xrightarrow{R_2 \leftarrow xR_2 - yR_1} \begin{pmatrix} x & y & z \\ 0 & bx-ay & bx-ay \\ z & c & z+c \end{pmatrix} \quad (2.0.2)$$

$$\xrightarrow{R_3 \leftarrow xR_3 - zR_1} \begin{pmatrix} x & a & x+a \\ 0 & bx-ay & bx-ay \\ 0 & cx-az & cx-az \end{pmatrix} \quad (2.0.3)$$

$$\xrightarrow{R_3 \leftarrow (bx-ay)R_3 - (cx-az)R_2} \begin{pmatrix} x & a & x+a \\ 0 & bx-ay & bx-ay \\ 0 & 0 & 0 \end{pmatrix} \quad (2.0.4)$$

Now the determinant is multiplication of pivots.

But in (2.0.4), we observe that the 3rd pivot is zero.

Therefore $\begin{vmatrix} x & a & x+a \\ y & b & y+b \\ z & c & z+c \end{vmatrix} = 0$