

# Assignment 2

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Download all python codes from

[https://github.com/Bharat437/Matrix\\_Theory/tree/master/Assignment3/Codes](https://github.com/Bharat437/Matrix_Theory/tree/master/Assignment3/Codes)

and latex-tikz codes from

[https://github.com/Bharat437/Matrix\\_Theory/tree/master/Assignment3](https://github.com/Bharat437/Matrix_Theory/tree/master/Assignment3)

## 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 transform given matrix to echelon form.

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

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

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

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

Now the determinant is multiplication of pivots.

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

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