

Answer on Question #55842 – Math – Linear Algebra

1. Consider a 3x3 square matrix given as

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

. What is the element in

a_{22} ?

2

0

1

0,0

Solution

$$A = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \quad a_{22} = 2$$

2. $A + B = B + A$

associative

m

commutative

m-n

Solution

$A + B = B + A$ – commutative

3. Find z by the use of determinant : $3x-4y+2z+8=0$, $x+5y-3z+2=0$, $5x+3y-z+6=0$

6

7

3

5

Solution

$$\Delta = \begin{vmatrix} 3 & -4 & 2 \\ 1 & 5 & -3 \\ 5 & 3 & -1 \end{vmatrix} = -15 + 6 + 60 - 50 - 4 + 27 = 24$$

$$\Delta_z = \begin{vmatrix} 3 & -4 & -8 \\ 1 & 5 & -2 \\ 5 & 3 & -6 \end{vmatrix} = -90 - 24 + 40 + 200 + 18 - 24 = 120$$

$$z = \frac{\Delta_z}{\Delta} = \frac{120}{24} = 5$$

4. Find x by the use of determinant : $3x-4y+2z+8=0$, $x+5y-3z+2=0$, $5x+3y-z+6=0$

3

5

2

-2

Solution

$$\Delta = \begin{vmatrix} 3 & -4 & 2 \\ 1 & 5 & -3 \\ 5 & 3 & -1 \end{vmatrix} = -15 + 6 + 60 - 50 - 4 + 27 = 24$$

$$\Delta_x = \begin{vmatrix} -8 & -4 & 2 \\ -2 & 5 & -3 \\ -6 & 3 & -1 \end{vmatrix} = 40 - 12 - 72 + 60 - 72 + 8 = -48$$

$$x = \frac{\Delta_x}{\Delta} = \frac{-48}{24} = -2$$

5. Compute the determinant using elements in the first row:

A||||1540-7-8371||||

-7

32

13

3

Solution

$$\begin{aligned} \det(A) &= \begin{vmatrix} 1 & 5 & 4 \\ 0 & -7 & -8 \\ 3 & 7 & 1 \end{vmatrix} = 1 \cdot \begin{vmatrix} -7 & -8 \\ 7 & 1 \end{vmatrix} - 5 \cdot \begin{vmatrix} 0 & -8 \\ 3 & 1 \end{vmatrix} + 4 \cdot \begin{vmatrix} 0 & -7 \\ 3 & 7 \end{vmatrix} = \\ &= (-7 \cdot 1 - 7 \cdot (-8)) - 5(0 \cdot 1 - 3 \cdot (-8)) + 4 \cdot (0 \cdot 7 - 3 \cdot (-7)) = 49 - \\ &120 + 84 = 13. \end{aligned}$$