



Determinants Ex 6.1 Q8

$$\text{Let } A = \begin{bmatrix} 2 & 5 \\ 2 & 1 \end{bmatrix}$$

$$\Rightarrow |A| = 2 - 10 = -8$$

$$B = \begin{bmatrix} 4 & -3 \\ 2 & 5 \end{bmatrix}$$

$$\Rightarrow |B| = 20 + 6 = 26$$

$$\begin{aligned} \text{Now } AB &= \begin{bmatrix} 2 & 5 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 4 & -3 \\ 2 & 5 \end{bmatrix} \\ &= \begin{bmatrix} 2 \times 4 + 5 \times 2 & 2 \times (-3) + 5 \times 5 \\ 2 \times 4 + 1 \times 2 & 2 \times (-3) + 1 \times 5 \end{bmatrix} \\ &= \begin{bmatrix} 8 + 10 & -6 + 25 \\ 8 + 2 & -6 + 5 \end{bmatrix} \\ &= \begin{bmatrix} 18 & 19 \\ 10 & -1 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} \Rightarrow |AB| &= 18 \times (-1) - (10)(19) \\ &= -18 - 190 = -208 \end{aligned}$$

$$\begin{aligned} \text{Now } |AB| &= |A| \times |B| \\ -208 &= (-8) \times (26) \\ -208 &= -208 \end{aligned}$$

Hence verified.

Determinants Ex 6.1 Q9

$$\text{Let } A = \begin{vmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{vmatrix}$$

Evaluating the determinant along the first column

$$\begin{aligned} |A| &= 1 \begin{vmatrix} 1 & 2 \\ 0 & 4 \end{vmatrix} - 0 \begin{vmatrix} 0 & 1 \\ 0 & 4 \end{vmatrix} + 0 \begin{vmatrix} 0 & 1 \\ 1 & 2 \end{vmatrix} \\ &= 1 \times (4 - 0) - 0 + 0 \\ &= 4 \end{aligned}$$

$$\text{Again } 3A = \begin{bmatrix} 3 & 0 & 3 \\ 0 & 3 & 6 \\ 0 & 0 & 12 \end{bmatrix} \quad (\text{every element of } A \text{ will be multiplied by } 3)$$

Now, evaluating this determinant

$$\begin{aligned} |3A| &= 3 \begin{vmatrix} 3 & 6 \\ 0 & 12 \end{vmatrix} - 0 \begin{vmatrix} 0 & 3 \\ 0 & 12 \end{vmatrix} + 0 \begin{vmatrix} 0 & 3 \\ 3 & 6 \end{vmatrix} \\ &= 3(36 - 0) - 0 + 0 \\ &= 108 \end{aligned}$$

Now, according to the question

$$\begin{aligned} |3A| &= 27|A| \\ 108 &= 27(4) & (\text{Substituting values}) \\ 108 &= 108 \end{aligned}$$

Hence proved

Determinants Ex 6.1 Q10

$$(i) \begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$$

$$\Rightarrow 2 \times 1 - 5 \times 4 = 2x \times x - 6 \times 4$$

$$\Rightarrow 2 - 20 = 2x^2 - 24$$

$$\Rightarrow 2x^2 = 6$$

$$\Rightarrow x^2 = 3$$

$$\Rightarrow x = \pm\sqrt{3}$$

$$(ii) \begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$$

$$\Rightarrow 2 \times 5 - 3 \times 4 = x \times 5 - 3 \times 2x$$

$$\Rightarrow 10 - 12 = 5x - 6x$$

$$\Rightarrow -2 = -x$$

$$\Rightarrow x = 2$$

(iii)

$$\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$$

$$3 - x^2 = 3 - 8$$

$$x^2 = 8$$

$$x = \pm 2\sqrt{2}$$

(iv)

$$\begin{vmatrix} 3x & 7 \\ 2 & 4 \end{vmatrix} = 10$$

$$12x - 14 = 10$$

$$12x = 24$$

$$x = 2$$

***** END *****

