

**TOPIC**

Mathematics – Section I – Question 18

**QUESTION**

The determinant of the matrix

$$\begin{bmatrix} 2 & 1 & 3 \\ 4 & 0 & 5 \\ 8 & 9 & 13 \end{bmatrix}$$

most nearly is

- (A) -90
- (B) 16
- (C) 20
- (D) 26

**HINT**

The determinant of the matrix

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

is

$$= a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

**SOLUTION**

The determinant of the matrix

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

is

$$\begin{aligned} &= a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix} \\ &= 2 \begin{vmatrix} 1 & 3 \\ 8 & 13 \end{vmatrix} - 1 \begin{vmatrix} 4 & 5 \\ 8 & 13 \end{vmatrix} + 3 \begin{vmatrix} 4 & 0 \\ 8 & 9 \end{vmatrix} \\ &= 2(1 \times 13 - 8 \times 3) - 1(4 \times 13 - 5 \times 8) + 3(4 \times 9 - 0 \times 8) \\ &= 16 \end{aligned}$$

**ANSWER**

(B)

**CONTRIBUTOR**

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