

Matrices and Determinants - Class XII

Past Year JEE Questions

Questions

Question: 01

$$\text{If } A = \begin{bmatrix} 1 & \sin \theta & 1 \\ -\sin \theta & 1 & \sin \theta \\ -1 & -\sin \theta & 1 \end{bmatrix};$$

then for all $\theta \in (\frac{3\pi}{4}, \frac{5\pi}{4})$, $\det(A)$ lies in the interval :

- A. $(\frac{3}{2}, 3]$
- B. $(0, \frac{3}{2}]$
- C. $[\frac{5}{2}, 4)$
- D. $(1, \frac{5}{2}]$

Solutions

Solution: 01

Explanation

$$|A| = \begin{vmatrix} 1 & \sin \theta & 1 \\ -\sin \theta & 1 & \sin \theta \\ -1 & -\sin \theta & 1 \end{vmatrix}$$

$$= 2(1 + \sin^2 \theta)$$

$$\theta \in (\frac{3\pi}{4}, \frac{5\pi}{4}) \Rightarrow \frac{1}{\sqrt{2}} < \sin \theta < \frac{1}{\sqrt{2}}$$

$$\Rightarrow 0 \leq \sin^2 \theta < \frac{1}{2}$$

$$\therefore |A| \in [2, 3)$$