

12.809

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# Question

If  $\mathbf{A} = \begin{pmatrix} 1 & -1 \\ 2 & -2 \end{pmatrix}$ , the eigenvalues of  $\mathbf{A}$  are

(BM 2024)

- a) -1 and 0
- b) -1 and +1
- c) -1 and -1
- d) +1 and 0

# Theoretical Solution

The eigenvalues of  $\mathbf{A}$  can be obtained by solving

$$\det(\mathbf{A} - \lambda \mathbf{I}) = 0 \quad (1)$$

$$\mathbf{A} - \lambda \mathbf{I} = \begin{pmatrix} 1 & -1 \\ 2 & -2 \end{pmatrix} - \lambda \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \quad (2)$$

$$\mathbf{A} - \lambda \mathbf{I} = \begin{pmatrix} 1 - \lambda & -1 \\ 2 & -2 - \lambda \end{pmatrix} \quad (3)$$

$$\det(\mathbf{A} - \lambda \mathbf{I}) = (\lambda - 1)(\lambda + 2) - (-1)(2) = 0 \quad (4)$$

$$\lambda^2 + \lambda = 0 \quad (5)$$

$$\lambda = 0 \quad \text{OR} \quad \lambda = -1 \quad (6)$$

Option-A is correct.