

Jan 2022

Q1. Choose the correct options from the following:

Options:

A. Consider two matrices A and B . If both the matrix multiplications AB and BA are well-defined then A and B are square matrices.

B. Consider two matrices A and B of order n . If A is not invertible, then AB is not invertible.

C. Consider two matrices A and B of order n . If $AB = B$, then $B = I$, where I is the identity matrix of order n .

D. There exists a 2×2 matrix $A \neq I$ such that $A^3 = I$, where I is the identity matrix of order 2×2 .

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Q2. Consider the following system of linear equations

$$\begin{aligned}x + y + z &= 2 \\ y - 3z &= 1 \\ 2x + y + 5z &= 3\end{aligned}$$

The number of solutions of the above system is

Options :

A. 0

B. 1

C. 2

D. infinite

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Q3. Which of the following statement(s) is/are true for an $n \times n$ matrix A ?

Options:

A. Let $\det(A) \neq 0$. Then determinant of A is unaltered by swapping any two rows of A

B. Determinant of A is unaltered when a multiple of a row is added to another row.

C. For any real number t , $\det(tA) = t^n \det(A)$

D. If $D = P^{-1}AP$, then $D = A$

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Q4. A is a square matrix of order 5. When the following sequence of row operations are performed on A , the result is the identity matrix.

- Swap the second and fifth rows
- Add three times the fourth row to the first row
- Divide the third row by 4
- Multiply the first row by 2

Compute $\det(A)$