ULTIMATE KCET

CRASH COURSE 2026

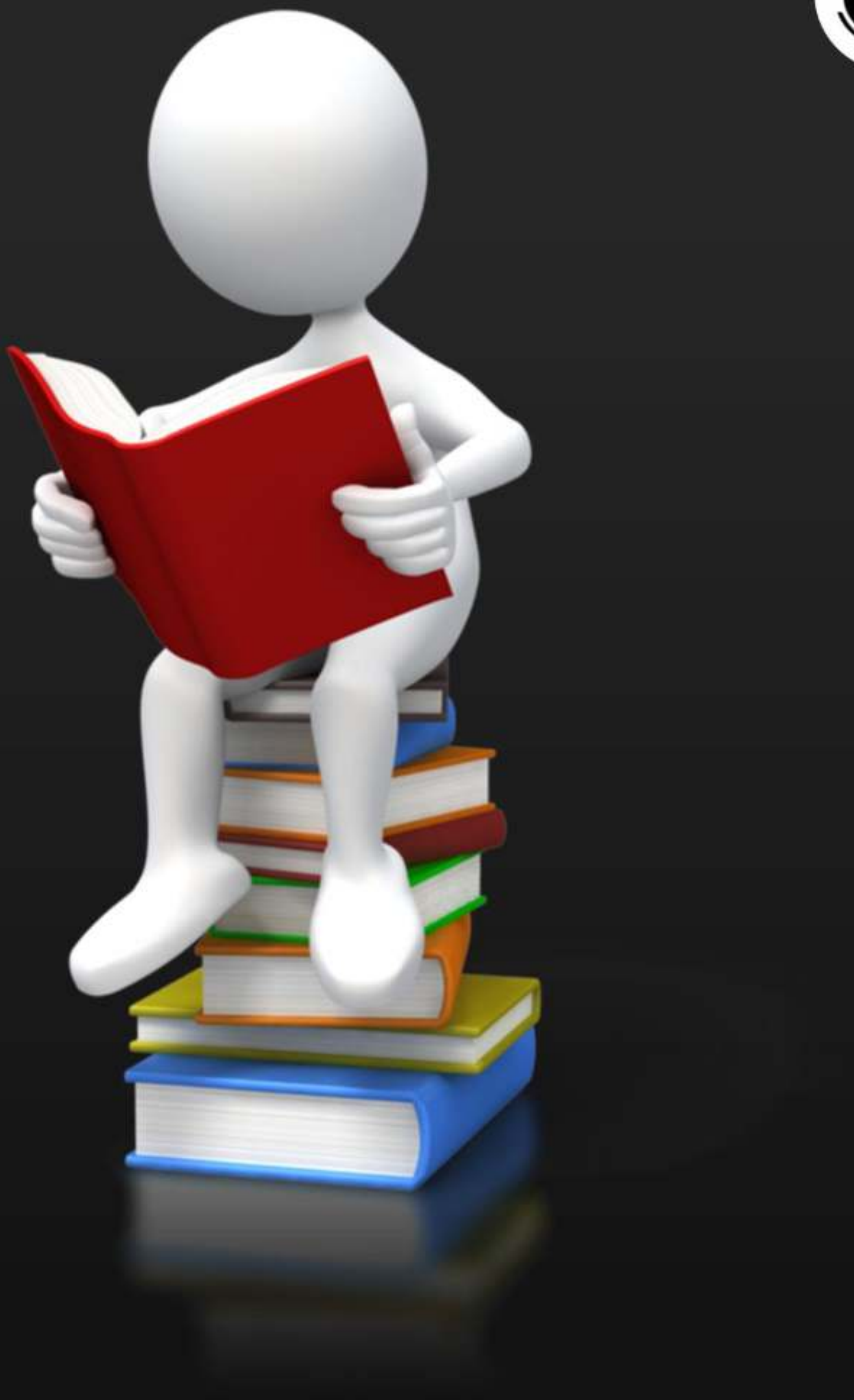
Mathematics | Lecture - 01

Matrices and Determinants

By – Guru sir

Topics *to be covered*

1. Matrices
2.
3.
4.



$f: R \to B$

given $f(x) = 4x - x^2$

is onto

find B

S. No	Chapter Name
1	Matrices and Determinants
2	Matrices and Determinants
3	Vectors and 3D
4	Vectors and 3D
5	Vectors and 3D
6	Inequalities
7	Domain and Range
8	Domain and Range
9	Trigonometry
10	Inverse Trigonometric Functions
11	Inverse Trigonometric Functions
12	Sets, Binomial Theorem, Relations
13	Relations and Functions
14	Trigonometry and ITF for Differentiation and Integration
15	Limits and Continuity
16	Differentiability
17	Methods of Differentiation
18	Methods of Differentiation
19	Methods of Differentiation
20	Probability
21	Probability, Permutations and Combinations
22	Integrals
23	Integrals
24	Integrals
25	Integrals
26	Application of Integrals
27	Differential Equations, Application of derivatives
28	Application of derivatives Statistics
29	Sequence and Series, Straight Lines and complex numbers

12m

Basics for calculus

Non engineering

⇓

PCB

Time Table

⇓

PCM (Engineering)

10 hrs → Class

6 hrs → self study → Revisio

PYQ

Mock test

14th April

⇓

Classes end

⇓

15th onwards

⇓

Full length mock test

$$A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix} = 2\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$

$$A^2 = 2A$$

if $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ find A^{10}

$$A^2 = 2A$$

$$\Downarrow$$

$$A^3 = A^2 \cdot A$$
$$= (2A)A$$
$$= 2(A^2)$$
$$= 2(2A)$$
$$A^3 = 4A = 2^2 A$$

$$A^4 = A^3 \cdot A$$
$$= 2^2 A \cdot A$$
$$= 2^2 (A^2)$$
$$= 2^2 (2A)$$
$$A^4 = 2^3 A$$

$$\vdots$$

$$A^{10} = 2^9 A$$

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} 3 & 3 & 3 \\ 3 & 3 & 3 \\ 3 & 3 & 3 \end{bmatrix}$$

$$A^2 = 3A$$

$$A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

$$A^2 = 4A$$

$$A^2 = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 3 & 3 \\ 3 & 3 & 3 \\ 3 & 3 & 3 \end{bmatrix}$$

QUESTION

$A^T = A$

If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ satisfies $A^4 = kA^T$, then find the value of k.

$A^4 = 2^3 A$

$A^4 = 2^3 A^T$

$\Downarrow$

$\boxed{k = 8}$

A 1

B 4

C 8

D 10

$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ & if

$A^4 = kA^T$

find k

$A^2 = 3A$

$A^3 = A^2 \cdot A = 3A\,A = 3A^2$

$A^3 = 3(3A) = 3^2 A$

$\Downarrow$

$A^4 = 3^3 A$

$A^4 = 27 A^T$

$\Downarrow$

$\boxed{k = 27}$

QUESTION

$\rightarrow A^2 = 4A$

If $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$, then A^4 is

$\parallel$

$A^4 = 4^3 A$

$= 64A$

$A^3 = A^2 \cdot A$

$= 4A^2 = 4(4A) = 4^2 A$

A. $16A$

B. $64A$ ✓

C. $32A$

D. $8A$

QUESTION

If $A = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$ then $A^3 - 35A$ is

$36A - 35A$

$= A$

A. A

B. $2A$

C. $-A$

D. $-11A$

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

$A^2 = A \cdot A = 2 \cdot 2 \begin{bmatrix} 3 & 3 & 3 \\ 3 & 3 & 3 \\ 3 & 3 & 3 \end{bmatrix} = 4(3)\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

$= 2(3)(2)\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ $\quad 2(3)(2)$

$A^2 = 6A$

$A^3 = A^2 A = 6A(A) = 6A^2 = 6(6A) = 36A$

$$A = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$$

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

$$A^2 = A \cdot A$$

$$= 2\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} 2\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$= 4\begin{bmatrix} 3 & 3 & 3 \\ 3 & 3 & 3 \\ 3 & 3 & 3 \end{bmatrix}$$

$$= 4(3)\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$= \underline{2(3)}(2)\underbrace{\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}}$$

$$\downarrow$$

$$\underline{A^2 = 6(A)}$$

$4(3)$

$\Downarrow$

$2 \times 2 \times 3$

$\Downarrow$

$2(3)2$

QUESTION

If $A = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$, then A^{10} is equal to

A $2^8 A$

B $2^9 A$

C $2^{10} A$

D $2^{11} A$

QUESTION

If matrix $A = \begin{bmatrix} 3 & -3 \\ -3 & 3 \end{bmatrix}$ and $A^2 = kA$, then find the value of k.

(A) 6 ✓

(B) 3

(C) 12

(D) 18

$A = 3\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$A^2 = A \cdot A$

$= 3 \cdot 3 \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$= 3(3)\begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$

$= 3(3)\,2\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$A^2 = 6(3)\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} = 6A$

$\rightarrow k = 6$

$A = \begin{bmatrix} 4 & -4 \\ -4 & 4 \end{bmatrix}$ if $A^3 = KA$ find 'K'

$A = 4\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$A^2 = 4 \cdot 4 \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$= 4 \cdot 4 \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$

$= 4 \cdot 4 \cdot 2 \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$A^2 = 8(4)\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

$A^2 = 8A$

$A^3 = A^2 \cdot A$

$= 8A(A)$

$= 8A^2$

$= 8(8A)$

$A^3 = 64A$

$K = 64$

$$\begin{bmatrix}1 & -1\\ -1 & 1\end{bmatrix}\begin{bmatrix}1 & -1\\ -1 & 1\end{bmatrix} = \begin{bmatrix}2 & -2\\ -2 & 2\end{bmatrix} = A$$

QUESTION

If $A = \begin{bmatrix}2 & -2\\ -2 & 2\end{bmatrix}$, then $A^n = 2^k A$, where $k =$

A 2^{n-1}

B $n+1$

C $n-1$

D $2(n-1)$

$$A = 2\begin{bmatrix}1 & -1\\ -1 & 1\end{bmatrix}$$

$$A^2 = 2(2)\begin{bmatrix}2 & -2\\ -2 & 2\end{bmatrix}$$

$$A^2 = 4A$$

$$A^3 = 4A^2 = 4(4A) = 16A = 4^2 A$$

$$A^4 = A^3 \cdot A = 4^2 A(A) = 4^2(A^2) = 4^2(4A) = 4^3 A$$

$$A^n = 4^{n-1} A = (2^2)^{n-1} A$$

$$A^n = 2^{2n-2} A \rightarrow k$$

$$k = 2n-2$$

$$k = 2(n-1)$$

$$A = \begin{bmatrix} -2 & 2 \\ 2 & -2 \end{bmatrix}$$

if $A^6 = kA$

Find 'k'

$$A = 2\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$A^2 = 4\begin{bmatrix} -1 & 1 \\ +1 & -1 \end{bmatrix}\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$= 4\begin{bmatrix} +2 & -2 \\ -2 & 2 \end{bmatrix}$$

$$= 4(-2)\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$A^2 = -4(2)\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix} = -4A$$

$$A^3 = A^2 \cdot A$$

$$= -4A^2$$

$$= -4(-4A)$$

$$A^3 = 16A = (-1)^2 4^2 A$$

$$\downarrow$$

$$A^5 = (-1)^4 4^4 A$$

$$A^5 = +1(256)A$$

$$\downarrow$$

$$A^6 = (-1)^5 4^5 A$$

$$A^6 = -1024A \Rightarrow k = -1024$$

QUESTION

If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$, then $A^4 = \ldots\ldots$

(A) $16A$

(B) $32I$

(C) $4A$

(D) $8A$

$A = 2\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = 2I$

$A^2 = A \cdot A$

$= 2I(2I)$

$= 4I = 2^2 I$

$A^4 = 2^4 I = 16I$

$= 8\underbrace{(2)I}$

$= 8A$

QUESTION

If $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$, then $A^3 =$

$$A^2 = \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$$

$$= 2\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$$

$$A^2 = 2A$$

$$A^3 = A^2 \cdot A$$
$$= 2A(A)$$
$$= 2A^2$$
$$= 2(2A)$$
$$= 4A$$

(A) A

(B) $2A$

(C) $3A$

(D) $4A$

if

$$A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

or

$$A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

or

$$A = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

$$\Rightarrow A^n = \begin{cases} A & \text{if } n = \text{odd} \\ I & \text{if } n = \text{even} \end{cases}$$

$\Rightarrow A^2 = I \qquad A^3 = A$

$A^4 = I \qquad A^5 = A$

$A^6 = I \qquad A^7 = A$

QUESTION

If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then $A^{5} =$ $\rightarrow$ odd

(A) I

(B) O

(C) A

(D) A^2

QUESTION

$\rightarrow$ even

If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^2 is equal to

(A) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

QUESTION

If $A = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$, then A^{4} is equal to

A $2A$

B I

C $4A$

D A

if $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ find $5A^9 + 10A^{12} - 6I$

Soln :-

$5A^9 + 10A^{12} - 6I$

$\downarrow$

$5A + 10I - 6I$

$5A + 4I$

$= \begin{bmatrix} 0 & 5 \\ 5 & 0 \end{bmatrix} + 4\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$= \begin{bmatrix} 4 & 5 \\ 5 & 4 \end{bmatrix}$

QUESTION

If matrix $A = [a_{ij}]_{2\times 2}$ where $a_{ij} = \begin{cases} 1 & \text{if } i \neq j \\ 0 & \text{if } i = j \end{cases}$ then A^2 is equal to

(A) I

(B) A

(C) O

(D) None of these

$A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

$A^2 = I$

$i = j \rightarrow$ Diagonal elements

$i \neq j \rightarrow$ Non Diagonal elements if $S = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$ & $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Then $SA =$

(1) $4A$

(2) $7A$

(3) $3A$

(4) $6A$

$$S = 3\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = 3I$$

$$SA = 3(IA) = \underline{3A}$$

QUESTION

If $S = [s_{ij}]$ is a scalar matrix such that $s_{ii} = k$ and A is a square matrix of the same order, then $AS = SA = ?$

A A^k

B $k + A$

C kA

D kS

if A is a square matrix

Then characteristic eqⁿ is

$$|A-\lambda I| = 0$$

$\Downarrow$

which is same as your given matrix

Exⁿ:- If $A = \begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$

Characteristic eqⁿ is

$$|A-\lambda I| = 0$$

$$\begin{vmatrix} 2-\lambda & 3 \\ 1 & 5-\lambda \end{vmatrix} = 0$$

$$(2-\lambda)(5-\lambda) - 3 = 0$$

$$10 - 2\lambda - 5\lambda + \lambda^2 - 3 = 0$$

$$\lambda^2 - 7\lambda + 7 = 0$$

$$\lambda^2 = 7\lambda - 7$$

$$A^2 = 7A - 7I$$

if $A=\begin{bmatrix}2 & 3\\ 1 & 5\end{bmatrix}$ find $2A^3-3A^2$

$$|A-\lambda I|=0$$

$$\begin{vmatrix}2-\lambda & 3\\ 1 & 5-\lambda\end{vmatrix}=0$$

$$10-2\lambda-5\lambda+\lambda^2-3=0$$

$$\lambda^2-7\lambda+7=0$$

$$\lambda^2=7\lambda-7$$

$$A^2=7A-7I$$

$$A^2=7A-7I$$ $\times^{ly}$ by A

$$A^3=7A^2-7A$$

$$A^3=7(7A-7I)-7A$$

$$A^3=49A-49I-7A$$

$$A^3=42A-49I$$

$$\therefore 2A^3-3A^2=84A-98I-(21A-21I)$$

$$=63A-77I$$

QUESTION

$A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \Rightarrow A^3 - A^2 =$

(A) $2A$

(B) $2I$

(C) A

(D) I

$|A - \lambda I| = 0$

$\begin{vmatrix} -1-\lambda & 0 \\ 0 & 2-\lambda \end{vmatrix} = 0$

$-2 + \lambda - 2\lambda + \lambda^2 = 0$

$\lambda^2 - \lambda - 2 = 0$

$\lambda^2 = \lambda + 2I$

$\underline{A^2 = A + 2I}$

$A^3 = A^2 + 2A$

$= (A + 2I) + 2A$

$A^3 = 3A + 2I$

$A^3 - A^2$

$= 3A + 2I - (A + 2I)$

$= 2A$

QUESTION

$IA = A$

If $A = \begin{bmatrix} 1 & -1 \\ 2 & -3 \end{bmatrix}$, then $A^3 - 4A =$

(A) $A + 2I$

(B) $-A + 2I$

(C) $A - 2I$

(D) $2I$

$|A - \lambda I| = 0$

$\begin{vmatrix} 1-\lambda & -1 \\ 2 & -3-\lambda \end{vmatrix} = 0$

$-3 - \lambda + 3\lambda + \lambda^2 + 2 = 0$

$\lambda^2 + 2\lambda - 1 = 0$

$\lambda^2 = I - 2\lambda$

$A^2 = I - 2A$ x'ly by A

$A^3 = A - 2A^2$

$= A - 2(I - 2A)$

$= A - 2I + 4A$

$= 5A - 2I$

$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$

$A^3 - 4A$

$= 5A - 2I - 4A$

$= A - 2I$

QUESTION

If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then $A^2 - 5A$ is equal to

A I

B $-I$

C $7I$

D $-7I$

$$\begin{vmatrix} 3-\lambda & 1 \\ -1 & 2-\lambda \end{vmatrix} = 0$$

$$6 - 3\lambda - 2\lambda + \lambda^2 + 1 = 0$$

$$\lambda^2 - 5\lambda + 7 = 0$$

$$\lambda^2 - 5\lambda = -7$$

$$\Downarrow$$

$$A^2 - 5A = -7I$$

$$A^2 = 5A - 7I$$

Find $A^2 - 9A$

$$\Downarrow$$

$$5A - 7I - 9A$$

$$= -4A - 7I$$

QUESTION

If $A = \begin{pmatrix} -1 & 3 \\ -2 & 4 \end{pmatrix}$, then A^4 in terms of A is

(A) $14A - 15I$

(B) $15A - 14I$

(C) $5A - 12I$

(D) $4A - 15I$

$$\begin{vmatrix} -1-\lambda & 3 \\ -2 & 4-\lambda \end{vmatrix} = 0$$

$$-4 + \lambda - 4\lambda + \lambda^2 + 6 = 0$$

$$\lambda^2 - 3\lambda + 2 = 0$$

$$\lambda^2 = 3\lambda - 2$$

$$\Downarrow$$

$$\lambda^2 = 3\lambda - 2(1)$$

$$\Downarrow$$

$$A^2 = 3A - 2I$$

$$A^3 = 3(3A - 2I) - 2A$$

$$= 9A - 6I - 2A$$

$$= 7A - 6I$$

$$A^4 = 7A^2 - 6A$$

$$= 7(3A - 2I) - 6A$$

$$= 15A - 14I$$

QUESTION

If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, then $(A-2I)(A-3I)$ is equal to

$A^2 - 3A - 2A + 6I$

$A^2 - 5A + 6I$

(A) A

(B) I

(C) $5I$

(D) O

$$\begin{vmatrix} 4-\lambda & 2 \\ -1 & 1-\lambda \end{vmatrix} = 0$$

$4 - 4\lambda - \lambda + \lambda^2 + 2 = 0$

$\lambda^2 - 5\lambda + 6 = 0$

$\Downarrow$

$A^2 - 5A + 6I = 0$

QUESTION

If $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ then A^n is $[n \in N]$

In these type of problems, Find A^2 & A^3 & guess A^n

(A) $\begin{bmatrix} n & n \\ 0 & n \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & n \\ 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 0 \\ n & 1 \end{bmatrix}$

$A^2 = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

$A^2 = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

$A^3 = A^2 \cdot A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$

$A^n = \begin{bmatrix} 1 & n \\ 0 & 1 \end{bmatrix}$

QUESTION

If $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, then A^n is

(A) $\begin{bmatrix} 1 & 2^n - 2 \\ 0 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & n^2 \\ 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2n \\ 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & n^2 \\ 1 & 1 \end{bmatrix}$

$A^2 = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

$= \begin{bmatrix} 1 & 4 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 2(2) \\ 0 & 1 \end{bmatrix}$

$A^3 = \begin{bmatrix} 1 & 4 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

$= \begin{bmatrix} 1 & 6 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 2(3) \\ 0 & 1 \end{bmatrix}$

$A^n = \begin{bmatrix} 1 & 2n \\ 0 & 1 \end{bmatrix}$

QUESTION

If $A = \begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}$, then A^n (where $n \in N$) equals

(A) $\begin{bmatrix} 1 & na \\ 0 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & n^2a \\ 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & na \\ 0 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} n & na \\ 0 & n \end{bmatrix}$

$A^2 = \begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 2a \\ 0 & 1 \end{bmatrix}$

$A^3 = \begin{bmatrix} 1 & 2a \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 3a \\ 0 & 1 \end{bmatrix}$

$A^n = \begin{bmatrix} 1 & na \\ 0 & 1 \end{bmatrix}$

QUESTION

LHS = RHS → No need to every element
⇓
Just find the first element

If $A = \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is such that $A^2 = I$ then

$$\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix} \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} \underline{\alpha^2 + \beta\gamma} & \_\_ \\ \_\_ & \_\_ \end{bmatrix} = \begin{bmatrix} \underline{1} & 0 \\ 0 & 1 \end{bmatrix}$$

$$\alpha^2 + \beta\gamma = 1$$

$$0 = 1 - \alpha^2 - \beta\gamma$$

(A) $1 + \alpha^2 + \beta\gamma = 0$

(B) $1 - \alpha^2 + \beta\gamma = 0$

(C) $1 - \alpha^2 - \beta\gamma = 0$

(D) $1 + \alpha^2 -$

QUESTION

If $\begin{bmatrix} a & b \\ c & -a \end{bmatrix} \rightarrow A$ is the square root of two rowed unit matrix then a, b and c should satisfy the relation

A $1 + a^2 + bc = 0$

B $1 - a^2 - bc = 0$

C $1 - a^2 + bc = 0$

D $a^2 + b^2 - 1 = 0$

$A = \sqrt{I}$

$A^2 = I$

$\begin{bmatrix} a & b \\ c & -a \end{bmatrix} \begin{bmatrix} a & b \\ c & -a \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\begin{bmatrix} a^2+bc & \_ \\ \_ & \_ \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$a^2 + bc = 1 \Rightarrow 1 - a^2 - bc = 0$

$(x+y)^n = x^n + {}^nC_1 x^{n-1} y + {}^nC_2 x^{n-2} y^2 + {}^nC_3 x^{n-3} y^3 + \dots + y^n$

QUESTION

If $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ then $(aI + bA)^n$ is (where I is the identity matrix of order 2)

$(aI)^n + {}^nC_1 (aI)^{n-1}(bA) + \underbrace{{}^nC_2 (aI)^{n-2}(bA)^2 + \dots}_{0}$

(A) $a^2 I + a^{n-1} b \cdot A$

(B) $a^n I + n a^n b A$

(C) $a^n I + n \cdot a^{n-1} b \cdot A$

(D) $a^n I + b^n A$

$A^2 = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = 0$

$A^3 = 0$

$A^4 = 0$

$A^5 = 0$

${}^nC_1 = n$

$= a^n I^n + n a^{n-1} I^{n-1} bA$

$= a^n I + n a^{n-1} bA$

QUESTION

If $AB = AC$ then

(A) $B = C$

(B) $B \neq C$

(C) B need not be equal to C

→ B may or may not be equal to C

(D) $B = -C$

QUESTION

$A^2 = \begin{bmatrix}1 & -2\\4 & 5\end{bmatrix}\begin{bmatrix}1 & -2\\4 & 5\end{bmatrix} = \begin{bmatrix}-7 & -12\\24 & 17\end{bmatrix}$

If $A = \begin{bmatrix}1 & -2\\4 & 5\end{bmatrix}$ and $f(t) = t^2 - 3t + 7$ then $f(A) + \begin{bmatrix}3 & 6\\-12 & -9\end{bmatrix} =$

(A) $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$

(B) $\begin{bmatrix}0 & 0\\0 & 0\end{bmatrix}$

(C) $\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$

(D) $\begin{bmatrix}1 & 1\\0 & 0\end{bmatrix}$

$A^2 - 3A + 7I + \begin{bmatrix}3 & 6\\-12 & -9\end{bmatrix}$

$\begin{bmatrix}-7 & -12\\24 & 17\end{bmatrix} - \begin{bmatrix}3 & -6\\12 & 15\end{bmatrix} + \begin{bmatrix}7 & 0\\0 & 7\end{bmatrix} + \begin{bmatrix}3 & 6\\-12 & -9\end{bmatrix}$

$\begin{bmatrix}-7-3+7+3 & -12+6+0+6\\ & \end{bmatrix}$

$(x-1)2 = x(y+2)$

QUESTION

If A and B are two matrices such that $AB = B$ and $BA = A$, then $A^2 + B^2$ is equal to

A^2

$= A \cdot A$

A. $2AB$

B. $2BA$

C. $A + B$

D. AB

$A^2 + B^2$

$\Downarrow$

$A(A) + B(B)$

$A(BA) + B(AB)$

$(AB)A + (BA)B$

$BA + AB$

$= A + B$

$A(BA)$ or $(BA)A$

Associative

$(AB)A$

$\downarrow$

BA

$\Downarrow$

A

$B(AA)$

No use further

QUESTION

If A and B are two matrices such that $AB = A$ and $BA = B$, then $A^2 + B^2$ is equal to

A $2AB$

B $2BA$

C $A + B$

D AB

$$A^2 + B^2$$

$$A \cdot A + B \cdot B$$

$$(AB) \cdot A + (BA) B$$

$$A(BA) + B(AB)$$

$$AB + BA$$

$$\underline{A + B}$$

QUESTION

If A and B are two matrices such that $AB = A$ and $BA = B$, then B^2 is equal to

(A) B

(B) A

(C) 1

(D) 0

B^2

$\downarrow$

$(B)B$

$\downarrow$

$(BA)B$

$\downarrow$

$B(AB)$

$\downarrow$

BA

$\downarrow$

B

QUESTION

If A and B are two matrices such that $AB = B$ and $BA = A$, then B^2 is equal to

(A) B

(B) A

(C) 1

(D) 0

B^2

$= B(B)$

$= B(AB)$

$= (BA)B$

$= AB$

$= B$

QUESTION

If $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 \end{bmatrix}$ then $BA =$

(A) $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

(B) $\begin{bmatrix} 3 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & 3 \end{bmatrix}$

(D) $\begin{bmatrix} 0 & -3 \end{bmatrix}$

QUESTION

Which of the following is not true, if A and B are two matrices each of order $n\,xn$, then

A $(A + B)' = B' + A'$

B $(A - B)' = A' - B'$

C $(AB)' = A'B'$

D $(A\,BC)' = C'B'A'$

QUESTION

If A and B are two matrices such that $A + B$ and AB are both defined then

A A and B are two matrices not necessarily of same order False ($A+B$ is not defined)

B A and B are square matrices of same order True

C A and B are matrices of same type False (AB is not defined)

D A and B are rectangular matrices of same order (AB is not defined) False

(E) A & B are matrices of same order False

QUESTION

If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then $A + A' = I$, if the value of α is

$\rightarrow \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\cos\alpha + \cos\alpha = 1$

$2\cos\alpha = 1$

$\cos\alpha = \frac{1}{2}$

$\alpha = \frac{\pi}{3} = 60^\circ$

(A) $\pi/6$

(B) $\pi/3$

(C) π

(D) $3\pi/2$

QUESTION

If $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$ Then the values of x and y respectively are

$x + y = 2 \rightarrow (1)$ | $-x + y = 4 \rightarrow (2)$

(A) $-3, -1$

(B) $1, 3$

(C) $3, 1$

(D) $-1, 3$

$(1) - (2)$

$2x = -2$

$x = -1$

$(1) + (2)$

$2y = 6$

$y = 3$

QUESTION

If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then AA'

$$\begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= I$$

(A) A

(B) Zero matrix

(C) A'

(D) I

QUESTION

$A^T = A \quad | \quad B^T = B$

$(XY)^T = Y^T X^T$

If A and B are symmetric matrices, then ABA is

Let

$C = ABA$

(A) symmetric matrix

(B) skew-symmetric matrix

(C) diagonal matrix

(D) scalar matrix

Consider

$C^T = (ABA)^T$

$= A^T B^T A^T$

$= ABA$

$C^T = C$

$C = ABA$ is symmetric

(1) if $A \to$ symmetric $\Rightarrow A^T = A$

&

$B \to$ skew symmetric $\Rightarrow B^T = -B$

Then ABA

Soln:

$C^T = (ABA)^T$

$= A^T B^T A^T$

$= A(-B)A$

$C^T = -(ABA)$

$C^T = -C$

$C = ABA$

is skew symmetric

QUESTION

If A and B are square matrices of same order and B is a skew symmetric matrix, then $A'BA$ is

$B^T = -B$

$$C^T = (A^T B A)^T$$
$$= A^T B^T (A^T)^T$$
$$= A^T(-B)A$$
$$= -(A^T B A)$$
$$C^T = -C$$

(A) Null matrix

(B) Diagonal matrix

(C) Skew symmetric matrix

(D) Symmetric matrix

QUESTION

$\rightarrow A^T = -A$ $\quad C =$

If A is a skew symmetric matrix, then A^{2021} is

Note:-

$(A^T)^n = (A^n)^T$

$n \rightarrow$ integer

A. Row matrix

B. Symmetric matrix

C. Column matrix

D. Skew symmetric matrix

Let

$C^T = (A^{2021})^T$

$= (A^T)^{2021}$

$= (-A)^{2021}$

$= -A^{2021}$

$C^T = -C$

QUESTION

$\to A^T = -A$

If A is skew-symmetric matrix and n is even positive integer, then A^n is

$C = A^n$

(A) a symmetric matrix

(B) skew-symmetric matrix

(C) diagonal matrix

(D) triangular matrix

$C^T = (A^n)^T$

$= (A^T)^n$

$= (-A)^n \to$ even

$C^T = +A^n$

$C^T = C$

if A is a square matrix

Then

$$\frac{A+A^T}{2} \longrightarrow \text{Symmetric}$$

$$\frac{A-A^T}{2} \longrightarrow \text{Skew symmetric}$$

QUESTION

If $A = \begin{bmatrix} 6 & 8 & 5 \\ 4 & 2 & 3 \\ 9 & 7 & 1 \end{bmatrix}$ is the sum of a symmetric matrix B and skew-symmetric matrix C, then B is

(A) $\begin{bmatrix} 6 & 6 & 7 \\ 6 & 2 & 5 \\ 7 & 5 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 2 & -2 \\ -2 & 5 & -2 \\ 2 & 2 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 6 & 6 & 7 \\ -6 & 2 & -5 \\ -7 & 5 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 0 & 6 & -2 \\ 2 & 2 & -2 \\ -2 & -2 & 0 \end{bmatrix}$

$$B = \frac{A + A^T}{2} = \begin{bmatrix} \frac{6+6}{2} = 6 & \frac{8+4}{2} & \frac{5+9}{2} \\ \frac{8+4}{2} & \frac{2+2}{2} & \frac{7+3}{2} \\ \frac{5+9}{2} & \frac{7+3}{2} & \frac{1+1}{2} \end{bmatrix} = \begin{bmatrix} 6 & 6 & 7 \\ 6 & 2 & 5 \\ 7 & 5 & 1 \end{bmatrix}$$

$$C = \frac{A - A^T}{2} = \begin{bmatrix} \frac{6-6}{2} & \frac{8-4}{2} & \frac{5-9}{2} \\ \frac{4-8}{2} & \frac{2-2}{2} & \frac{3-7}{2} \\ \frac{9-5}{2} & \frac{7-3}{2} & \frac{1-1}{2} \end{bmatrix} = \begin{bmatrix} 0 & 2 & -2 \\ -2 & 0 & -2 \\ 2 & 2 & 0 \end{bmatrix}$$

QUESTION

If $A = \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$ is written as $A = P + Q$, where P is symmetric and Q is skew symmetric, then write the matrix P.

$$\frac{A+A^T}{2} = \begin{bmatrix} 3 & 6 \\ 6 & 9 \end{bmatrix}$$

A $\begin{bmatrix} 3 & 6 \\ 6 & 9 \end{bmatrix}$

B $\begin{bmatrix} 3 & 6 \\ 9 & 9 \end{bmatrix}$

C $\begin{bmatrix} 3 & 3 \\ 6 & 9 \end{bmatrix}$

D None of these

QUESTION

If the matrix $\begin{bmatrix} 2 & 3 \\ 5 & -1 \end{bmatrix} = A + B$, where A is symmetric and B is skew symmetric, then $B =$

A $\begin{bmatrix} 2 & 4 \\ 4 & -1 \end{bmatrix}$

B $\begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix}$

C $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$

D $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

$$B = \frac{A - A^T}{2}$$

$$= \begin{bmatrix} 0 & \frac{3-5}{2} \\ \frac{5-3}{2} & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

QUESTION

The symmetric part of the matrix $A = \begin{bmatrix} 1 & 2 & 4 \\ 6 & 8 & 2 \\ 2 & -2 & 7 \end{bmatrix}$ is

(A) $\begin{bmatrix} 0 & -2 & -1 \\ -2 & 0 & -2 \\ -1 & -2 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 4 & 3 \\ 2 & 8 & 0 \\ 3 & 0 & 7 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & -2 & 1 \\ 2 & 0 & 2 \\ -1 & 2 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 4 & 3 \\ 4 & 8 & 0 \\ 3 & 0 & 7 \end{bmatrix}$ ✓

Skew symmetric Part

$$= \begin{bmatrix} 0 & \frac{2-6}{2} & \frac{4-2}{2} \\ \frac{6-2}{2} & 0 & \frac{2-(-2)}{2} \\ \frac{2-4}{2} & \frac{-2-2}{2} & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & -2 & +1 \\ 2 & 0 & 2 \\ -1 & -2 & 0 \end{bmatrix}$$

QUESTION

If a square matrix $A = [a_{ij}], a_{ij} = i^2 - j^2$ is of order 2 , then

$a_{11} = 1 - 1 = 0$	$a_{12} = 1 - 4 = -3$
$a_{21} = 4 - 1 = 3$	$a_{22} = 4 - 4 = 0$

$$\begin{bmatrix} 0 & -3 \\ 3 & 0 \end{bmatrix}$$

(A) A is a skew-symmetric matrix

(B) A is a symmetric matrix

(C) A is neither symmetric nor skew-symmetric

(D) A is a diagonal matrix

if $AB = BA = I$

$\Downarrow$

Then $B = A^{-1}$

QUESTION

If $A=\begin{bmatrix}1 & \tan\frac{\alpha}{2}\\ -\tan\frac{\alpha}{2} & 1\end{bmatrix}$ and $AB=I$ then $B=$ A^{-1}

$= \frac{1}{|A|}\text{Adj}\,A$

$= \frac{1}{1+\tan^2\frac{\alpha}{2}}\begin{bmatrix}1 & -\tan\frac{\alpha}{2}\\ \tan\frac{\alpha}{2} & 1\end{bmatrix}$

$= \frac{1}{\sec^2\frac{\alpha}{2}}A^T$

$= \cos^2\frac{\alpha}{2}(A^T)$

(A) $\cos^2\frac{\alpha}{2}\cdot I$

(B) $\cos^2\frac{\alpha}{2}\cdot A^T$

(C) $\sin^2\frac{\alpha}{2}\cdot A$

(D) $\cos^2\frac{\alpha}{2}\cdot A$

QUESTION

If $5A = \begin{pmatrix} 3 & -4 \\ 4 & x \end{pmatrix}$ and $AA^\top = A^\top A = I$ then $x =$

(A) 3

(B) -3

(C) 2

(D) -2

$AA^T = \frac{1}{5}\begin{bmatrix} 3 & -4 \\ 4 & x \end{bmatrix} \frac{1}{5}\begin{bmatrix} 3 & 4 \\ -4 & x \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$= \frac{1}{25}\begin{bmatrix} & \underline{12-4x} \\ \_ & \end{bmatrix} = \begin{bmatrix} 1 & \underline{0} \\ 0 & 1 \end{bmatrix}$

$\frac{1}{25}[12-4x] = 0$

$x = 3$

QUESTION

If $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix} A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then the matrix A is

$BA = I$

$\Downarrow$

$A = B^{-1}$

$= \frac{1}{|B|} \operatorname{Adj} B$

$= \frac{1}{1} \begin{bmatrix} 2 & -1 \\ -3 & 2 \end{bmatrix}$

(A) $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$

(B) $\begin{pmatrix} -2 & 1 \\ 3 & -2 \end{pmatrix}$

(C) $\begin{pmatrix} 2 & -1 \\ 3 & 2 \end{pmatrix}$

(D) $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$

QUESTION

$\to$ inverse $= \frac{1}{\sec^2\theta}\begin{bmatrix} 1 & -\tan\theta \\ +\tan\theta & 1 \end{bmatrix}$

If $\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix}\begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then

$\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix} \frac{1}{\sec^2\theta}\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix}$

(A) $a = 1 = b$

(B) $a = \cos 2\theta,\ b = \sin 2\theta$

(C) $a = \sin 2\theta,\ \mathrm{b} = \cos 2\theta$

(D) $a = \cos\theta, b = \sin\theta$

$\frac{1}{\sec^2\theta}\begin{bmatrix} 1-\tan^2\theta & -2\tan\theta \\ 2\tan\theta & 1-\tan^2\theta \end{bmatrix} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

$a = \frac{1-\tan^2\theta}{\sec^2\theta} = \cos^2\theta - \sin^2\theta = \cos 2\theta$

$b = \frac{2\tan\theta}{\sec^2\theta} = \frac{2\sin\theta}{\cos\theta} \times \cos^2\theta = \sin 2\theta$

(1) If $A = \begin{bmatrix} 4 & a \\ -7 & 6 \end{bmatrix}$ is symmetric

find a

Soln:

$a = -7$

(2) if $A = \begin{bmatrix} a & b \\ 6 & c \end{bmatrix}$ is skew symmetric

Find $a + b + c$

Soln:

Here $a = 0$

$b = -6$

$c = 0$

$a + b + c = -6$

if $A = \begin{bmatrix} a & d & e \\ -6 & b & f \\ 7 & -8 & c \end{bmatrix}$ is skew symmetric

find $a+b+c+2d+3e+4f$

Soln:

$a=0$

$b=0$

$c=0$

$d=-(-6)=6$

$e=-7$

$f=-(-8)=8$

$0+0+0+2(6)+3(-7)+4(8)$

$=12-21+32$

$=44-21$

$=\underline{23}$

skew symmetric

$\Downarrow$

Principal diagonal elements $=0$

QUESTION

If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x-1 \end{bmatrix}$ is symmetric then x is

$x + 2 = 2x - 3$

$-x = -5$

$x = 5$

A 3

B 5

C 2

D 4

if $A = \begin{bmatrix} 0 & x+2 \\ 2x-3 & 0 \end{bmatrix}$ is skew symmetric find x

Soln:-

$x + 2 = -(2x - 3)$

$x + 2 = -2x + 3$

$3x = 1$

$x = 1/3$

QUESTION

If matrix $\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is a skew symmetric matrix, then find the values of a, b and c. Find the value of $a + b + 2c$

A. -8

B. -3

C. -5

D. 6

$a = -2$

$b = 0$

$c = -3$

$-2 + 0 + 2(-3)$

$-2 - 6$

$= -8$

QUESTION

If the matrix $\begin{bmatrix} a & b & c \\ 2 & d & e \\ 3 & -4 & f \end{bmatrix}$ is a skew - symmetric matrix then the value of $a + b + c + d + e + f$ is

A 1

B -1

C 9

D -9

$a = 0$ | $b = -2$

$d = 0$ | $c = -3$

$f = 0$ | $e = 4$

-1

QUESTION

If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then find the value of α for which $A^2 = B$.

A 1

B -1

C 4

D No real values

$$\begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} \alpha^2 & 0 \\ \alpha+1 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$$

$\alpha^2 = 1$ & $\alpha + 1 = 5$

$\alpha = \pm 1$ | $\alpha = 4$

unique value is not obtained

QUESTION

If $A_\theta = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$ then $A_\alpha \cdot A_\beta =$.

A. $A_{\alpha+\beta}$

B. A

C. $A_\alpha + A_\beta$

D. I

QUESTION

If $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}\begin{bmatrix} 1 & -3 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} -4 & 6 \\ -9 & x \end{bmatrix}$, then value of x is

(A) 17

(B) 14

(C) 13

(D) 15

QUESTION

If A and B are skew symmetric matix than $3A + B$ is

(A) Null matrix

(B) Symmetric matrix

(C) Skew symmetric

(D) None of these

QUESTION

If A is a matrix of order 3×3, then $(A^2)^{-1}$ is equal to

$(A^n)^{-1} = (A^{-1})^n$

(A) $(A^2)^2$

(B) A^2

(C) $(A^{-1})^2$

(D) $(-A)^{-2}$

QUESTION

The simplified form of

$$\tan\theta\begin{bmatrix}\sec\theta & \tan\theta\\ \tan\theta & -\sec\theta\end{bmatrix}+\sec\theta\begin{bmatrix}-\tan\theta & -\sec\theta\\ -\sec\theta & \tan\theta\end{bmatrix} \text{ is}$$

(A) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

(B) $\begin{bmatrix}0 & -1\\ -1 & 0\end{bmatrix}$

(C) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$

(D) $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$

QUESTION

If $\begin{bmatrix} x^2-4x & x^2 \\ x^2 & x^3 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -x+2 & 1 \end{bmatrix}$, then find x.

$x^2 = 1$

$x = \pm 1$

A 0

B 1

C 2

D 3

QUESTION

If $\begin{bmatrix} x+y & 2 \\ 5 & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, then $x^2 + y^2 =$ $4^2+2^2=16+4=20$

$x+y=6 \mid xy=8$

$y=6-x \quad x(6-x)=8$

$6x-x^2=8$

$x^2-6x+8=0 \qquad +8 \to -4, -2$

$x=4, x=2$

$y=2 \mid y=4$

(A) 5

(B) 15

(C) 20

(D) 24

QUESTION

Write the number of all possible matrices of order 2×2 with each entry 1,2 or 3 .

$$\begin{bmatrix} \underline{3} & \underline{3} \\ \underline{3} & \underline{3} \end{bmatrix}$$

(A) 18

(B) 4

(C) 81

(D) 64

$3 \times 3 \times 3 \times 3$

$= 3^4$

$= \underline{81}$

QUESTION

If $A = \text{diag}(a, b, c)$ then A^n is

$$A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$$ is a diagonal matrix

$$A^n = \begin{bmatrix} a^n & 0 & 0 \\ 0 & b^n & 0 \\ 0 & 0 & c^n \end{bmatrix}$$

A abc

B diag (na, nb, nc)

C diag $(a^n\ b^n\ c^n)$

D $a^n\ b^n\ c^n$

Ex:

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

Find A^9

Soln:

$$A^9 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 512 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

QUESTION

$A^{-1} = \frac{1}{-1}\begin{bmatrix} -2 & 1 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix} = A$

If $A = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$, then the inverse of the matrix A^3 is

(A) A

(B) I

(C) $-I$

(D) $-A$

$|A - \lambda I| = 0$

$\begin{vmatrix} 2-\lambda & -1 \\ 3 & -2-\lambda \end{vmatrix} = 0$

$-4 - 2\lambda + 2\lambda + \lambda^2 + 3 = 0$

$\lambda^2 - 1 = 0$

$A^2 = I$

$A^3 = A$

$A^3 = A$

$(A^3)^{-1} = A^{-1} = A$

QUESTION

If A and B are square matrices of order ' n ' such that $A^2-B^2=(A-B)(A+B)$, then which of the following will be true?

$\cancel{A^2} - \cancel{B^2} = \cancel{A^2} + AB - BA - \cancel{B^2}$

$0 = AB - BA$

$AB = BA$

(A) Either of A or B is zero matrix.

(B) $A=B$

(C) $AB=BA$

(D) Either of A or B is an identity matrix

QUESTION

If A and B are square matrices of the same order such that $(A+B)(A-B)=A^2-B^2$, then $(ABA^{-1})^2 =$

$\Downarrow$

$AB = BA$

(Refer Previous Problem)

$[\underline{AB}A^{-1}]^2$

since $AB = BA$

$= [\underline{B}(A A^{-1})]^2$

$= [B I]^2$

$= B^2$

A) A^2B^2

B) A^2

C) B^2

D) I

10 min
27 min ⇒ 64 min
27 min

60 Questions

Easy

⇓

20 Questions

⇓

20 x 30 seconds

= 600 seconds

= 10 minutes

Moderate

⇓

25 to 30 Questions

⇓

27 x 60 seconds

= 1620 seconds

= 27 minutes

Difficult

⇓

10 to 15 Questions

⇓

18 x 90 seconds

= 1620 seconds

= 27 minutes

37 minutes

EASY:-

12 to 15 m

1. Matrices
2. Determinants
3. Vector Algebra
4. 3D Geometry
5. Sets
6. Binomial theorem
7. Complex Numbers
8. Statistics
9. Sequence & Series
10. Inequalities
11. Limits
12. Straight Lines
13. Conic Sections

MODERATE:-

1. Relations & Functions
   (Class 11th & 12th)

2. ITF

3. Continuity, Differentiability
   & Differentiation

4. Application of Integration

5. Differential equations
   1. order & Degree
   2. variable separable

6. LPP

7. Probability
   1. conditional probability
   2. Indpendent events
   3. Class 11th

8. Trigonometry

DIFFICULT:-

1. Application of Derivatives

2. Integrals

3. Probability (Bayes' Theorem)

4. Permutations & Combinations

5. DE (LDE)

Thank

You