MATHS

BOOKS - BETTER CHOICE PUBLICATION

MATRICES

Solve Examples Section I M C Q

1. If $A = [1 \quad 2 \quad 3], B = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$, then AB equals

A. $[2 \quad 6 \quad 3]$

B. $\begin{bmatrix} 2 \\ 6 \\ 3 \end{bmatrix}$

C. [12]

D. none of these

Answer: D

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2. The matrix $A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ is a (a) identity matrix (b) Diagonal matrix (c) symmetric matrix (d) skew symmetric matrix

A. identity matrix

B. Diagonal matrix

C. Symmetric matrix

D. Skew symmetric matrix

Answer: D

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3. If A = $\begin{pmatrix} 2 & 1 & 3 \end{pmatrix}$, then AA^T is equal to

A. $\begin{bmatrix} 4 & 1 & 9 \end{bmatrix}$

B. $\begin{bmatrix} 4 \\ 1 \\ 9 \end{bmatrix}$

C. [14]

D. [6]

Answer: C

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4. The number of all possible matrices of order 3×3 with each entry 0 or 1 is:

A. 27

B. 18

C. 81

D. 512

Answer: D

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5. If A is a matrix of order 3×4, then each column of matrix A contains elements :

A. 12

B. 4

C. 3

D. none of these

Answer: C

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6. If AB = C, where B and C are matrices of order 3×5, then order of A is :

A. 3×3

B. 3×3

C. 5×5

D. 5×3

Answer: A

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7. If $A = \left[a_{ij}\right]_{\text{mxn}}$ is a rectangular matrix, then

A. $m > n$

B. $m = n$

C. $m < n$

D. none of these

Answer: D

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8. For any two matrices A and B we have

A. AB = BA

B. $AB \neq BA$

C. AB = 0

D. none of these

Answer: D

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Solve Examples Section Ii Short Answer Type Questions

1. If a matrix has 18 elements, what are the possible orders it can have? What, if it has 5 elements?

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2. Construct $a2 \times 2$ matrix $A = \left[a_{ij}\right]$ whose elements are given by $a_{ij} = \frac{i}{j}$

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3. Construct a 3×2 matrix whose elements are given by $a_ij = \frac{1}{2}|i - 3j|$

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4. Find the value of x, y, z from the following equation

$$\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$$

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5. Find the values of a, b, c and d from the following equations

$$\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$$

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6. Find X and Y, if $2X+3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and $3X+2Y = \begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}$

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7. If $x\begin{bmatrix} 2 \\ 3 \end{bmatrix} + y\begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$, then find the value of x and y.

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Solve Examples Section Iii Short Answer Type Questions

1. Compute the indicated products:

$$\begin{bmatrix} 3 & -1 & 3 \\ -1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 2 & -3 \\ 1 & 0 \\ 3 & 1 \end{bmatrix}$$

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2. If $A = \begin{bmatrix} 5 & 2 \\ -1 & 2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ show that (A - 3I) (A - 4I) = 0

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3. If A $= \begin{bmatrix} -2 & -3 \\ -2 & 4 \end{bmatrix}$,find $-A^2 + 6A$

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4. If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$, then find AB, BA. Show that $AB \neq BA$

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5. Find the value of x such that $\begin{bmatrix} 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix} = 0$

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6. If Matrix $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then show that $A^2 - 5A + 7I = 0$ and hence find A^{-1} from this equation.

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7. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, then show that $A^3 - 23A - 40I = O$

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8. If $A = \begin{bmatrix} 0 & 3 \\ -7 & 5 \end{bmatrix}, I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then find k so that $kA^2 = 5A + 21I$

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9. Find f(A), given that $f(x) = x^2 - 7x - 2$ and $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

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10. Find the matrix X such that

$$X\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$$

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Solve Examples Section Iv Short Answer Type Questions

1. If $A = \begin{bmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \\ -2 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 1 & -5 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$,

then verify that $(A + B)' = A' + B'$

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2. If $A = \begin{bmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \\ -2 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 1 & -5 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$,

then verify that $(A - B)' = A' - B'$

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3. If $A = \begin{bmatrix} -2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$, then find $(A + 2B)'$

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4. If A $= \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}, B = \begin{bmatrix} -1 & 2 & 1 \end{bmatrix}$ verify that (AB)' = B' A'

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5. If A $= \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}, B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ verify that (AB)' = B' A'

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6. If $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$, then verify that AA' = A' A = I

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7. For the matrix $A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$, verify that : A + A' is a Symmetric Matrix

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8. For the matrix $A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$, verify that : A - A' is a Skew-Symmetric Matrix

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9. Show that the matrix $A = \begin{bmatrix} 1 & -1 & 5 \\ -1 & 2 & 1 \\ 5 & 1 & 3 \end{bmatrix}$ is a symmetric matrix.

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10. Show that the matrix B`AB) is symmetric or skew symmetric according as A is symmetric or skew

symmetric.

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11. Express $\begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$ as a sum of symmetric and skew symmetric matrix

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12. By using elementary transformation, find the inverse of the matrix

$\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$

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13. Using elementary transformations, find the inverse of each of the matrix, if it exists: $\begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$

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Solve Examples Section V Long Answer Type Questions

1. Let $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, show that $(aI + bA)^n = a^n I + na^{n-1}bA$, where I is the identity matrix of order 2 and$n \in N$

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2. If $A = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$, then prove by Mathematical Induction that : $A^n = \begin{pmatrix} 1+2n & -4n \\ n & 1-2n \end{pmatrix}$, where $n \in N$

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3. f A and B are square matrices of the same order such that AB = BA, then prove by induction that $AB^n = B^n A$ Further, prove that $(AB)^n = A^n B^n$ for all $n \in N$

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4. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$, prove that $A^n = \begin{bmatrix} 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \end{bmatrix}, n \in N$

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5. If $A = \begin{bmatrix} 0 & -\frac{\tan\alpha}{2} \\ \frac{\tan\alpha}{2} & 0 \end{bmatrix}$ and I is the identity matrix of order 2, show that $I + A = (I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

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6. Express the following matrices as the sum of a symmetric and skew-symmetric matrix.

$$\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$$

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7. Using elementary transformation, find the inverse of the following matrix

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

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Assignment Section I M C Q

1. If A is matrix of 4×3 then each column of A contains

A. 12 elements

B. 4 elements

C. 3 elements

D. None of these

Answer: C

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2. A matrix 2×3 whose elements are $a_{ij} = (i + j)^2$ is

A. $\begin{bmatrix} 4 & 9 & 16 \\ 9 & 16 & 25 \end{bmatrix}$

B. $\begin{bmatrix} 4 & 16 & 9 \\ 9 & 16 & 25 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 9 & 16 \\ 16 & 9 & 25 \end{bmatrix}$

D. None of these

Answer: B

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3. If A $= \begin{bmatrix} 2 & 3 & 4 \\ -1 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 3 & -4 \\ -5 & 6 \end{bmatrix}$ then value of AB is

A. $\begin{bmatrix} 9 & 16 \\ 20 & 40 \end{bmatrix}$

B. $\begin{bmatrix} -9 & 16 \\ 30 & 40 \end{bmatrix}$

C. $\begin{bmatrix} -9 & 16 \\ 30 & -40 \end{bmatrix}$

D. None of these

Answer: C

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4. If A $= \begin{bmatrix} 2 & -1 \\ 4 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ then A + 2B is

A. $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 6 & 5 \\ 6 & 6 \end{bmatrix}$

C. $\begin{bmatrix} 6 & 6 \\ 5 & 4 \end{bmatrix}$

D. None of these

Answer: C

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5. If A $= \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$ then the value of A^2 is

A. $\begin{bmatrix} 1 & 1 \\ 1 & 4 \end{bmatrix}$

B. $\begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -3 \\ -3 & 5 \end{bmatrix}$

D. None of these

Answer: C

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

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. π

D. $\frac{3\pi}{2}$

Answer: B

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

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8. The value of x for which the following matrices are equal is

$$\begin{bmatrix} 2x+5y & y+7 \\ 0 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 6 \\ 0 & 4 \end{bmatrix}$$ is

A. 1

B. 3

C. 0

D. None of these

Answer: A

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9. If A, B are symmetric matrices of same order, then AB - BA is a :

A. skew - symmetric matrix

B. symmetric matrix

C. zero matrix

D. Identity matrix

Answer: A

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10. If $A = \begin{bmatrix} 1 & -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$ then the BA is

A. [9]

B. $\begin{bmatrix} 2 & -4 & 6 \\ 1 & -2 & 3 \\ 3 & -3 & 9 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 1 & 3 \\ -4 & -2 & -6 \\ 6 & 3 & 9 \end{bmatrix}$

D. None of these

Answer: C

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Assignment Section Ii Short Answer Type Questions

1. If a matrix has 8 elements , what are the possible order it can have ?

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2. Construct a 2×2 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = \frac{1}{2}|4i - 3j|$

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3. Construct a 2×4 matrix $a = [a_{ij}]$ whose elements are given by $a_{ij} = 2i - j$

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4. If $\begin{bmatrix} x & x-y \\ 2x+y & 7 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 8 & 7 \end{bmatrix}$, then find the value of y

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5. Find the value of 'x' if

$$\begin{bmatrix} 3x+y & -y \\ 2y & -x3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ -5 & 3 \end{bmatrix}$$

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6. If $\begin{bmatrix} x+2y & -y \\ 3x & 4 \end{bmatrix} = \begin{bmatrix} -4 & 3 \\ 6 & 4 \end{bmatrix}$, find the value of x and y

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7. For what values of x and y are the following matrices are equal ?

$$A = \begin{bmatrix} 2x+1 & 3y \\ 0 & y^2-5y \end{bmatrix}, B = \begin{bmatrix} x+3 & y^2+2 \\ 0 & -6 \end{bmatrix}$$

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8. Find the values of a, b, c and d from the equation :

$$\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$$ and write correct answer from the following:

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9. If $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = a + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$, then find the matrix A

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10. If $3A - B = \begin{bmatrix} 5 & 0 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$, then find the matrix A

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11. Simplify,

$$\cos\theta\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}+\sin\theta\begin{bmatrix}\sin\theta & -\cos\theta\\ \cos\theta & \sin\theta\end{bmatrix}$$

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12. Find matrices X and Y is

$$2X-Y=\begin{bmatrix}6 & -6 & 0\\ -4 & 2 & 1\end{bmatrix} \text{ and } X+2Y=\begin{bmatrix}3 & 2 & 5\\ -2 & 1 & 7\end{bmatrix}$$

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13. Solve the equation for x, y, z , t

$$2\begin{bmatrix} x & y \\ z & t \end{bmatrix} + 3\begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix} = 3\begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$$

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14. Solve the matrix equation of the find the value x & y

$$\begin{bmatrix} x^2 \\ y^2 \end{bmatrix} - 3\begin{bmatrix} x \\ 2y \end{bmatrix} = \begin{bmatrix} -2 \\ 9 \end{bmatrix}$$

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Assignment Section Iii Short Answer Type Questions

1. Find AB and BA when

$$A = \begin{bmatrix} 2 & -1 & 3 \\ -3 & 2 & 0 \\ 5 & 1 & -1 \end{bmatrix}, B = \begin{bmatrix} -3 & 2 & -2 \\ 0 & 5 & 2 \\ 1 & -2 & 1 \end{bmatrix}$$

If AB = BA ? What conclusion do you draw ?

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2. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ and $B = \begin{bmatrix} \cos\beta & \sin\beta \\ \sin\beta & \cos\beta \end{bmatrix}$

show that AB = BA

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3. Evaluate $\begin{bmatrix} 1 & 3 & 5 \end{bmatrix} \begin{bmatrix} 1 & 0 & 3 \\ 2 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 4 \\ 6 \end{bmatrix}$

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4. Let $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then show that $A^2 = \begin{bmatrix} \cos 2\theta & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta \end{bmatrix}$

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5. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 0 & 4 \\ -1 & 7 \end{bmatrix}$, find $3A^2 - 2B + I_2$

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6. A $= \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, verify that $A^2 = I$

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7. If $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = kA$ then find the value of k

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8. If $A = \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$ and $A^2 = \lambda A$ then find the value of λ

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9. Solve the matrix equation

$$\begin{bmatrix} 2x & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} x \\ 3 \end{bmatrix} = 0$$

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10. If $\begin{bmatrix} 3 & 4 \\ 2 & x \end{bmatrix} \begin{bmatrix} x \\ 1 \end{bmatrix} = \begin{bmatrix} 19 \\ 15 \end{bmatrix}$, find the value of x

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11. Solve the matrix equation

$$\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = 0$$

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12. Solve for x and y, given that

$$\begin{bmatrix} x & y \\ 3y & x \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$$

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13. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = O$

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14. If A $= \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ then find $A^2 - 3A + 2I$

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15. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then find k so that $A^2 = kA - 2I$

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16. If A $= \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$, find x and y such that $A^2 - xA + yI = 0$

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17. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, $f(x) = x^2 - 2x - 3$, show that f(A) = 0

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18. If A $= \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix} f(x) = x^2 - 4x + 7$ show that f(A) = 0

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19. If A $= \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ find f (A) where $f(x) = x^3 + 3x^2 - 4x$

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20. Find the value of a and b for which the following holds :

$$\begin{bmatrix} a & b \\ -a & 2b \end{bmatrix} \begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$$

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Assignment Section Iv Short Answer Type Questions

1. If $A = \begin{bmatrix} 3 & 4 \\ 2 & 3 \end{bmatrix}$, find A + A'

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2. If $A' = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$,then find A' - B'

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3. $A' = \begin{bmatrix} -3 & 1 \\ 2 & 1 \\ 0 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & -1 \end{bmatrix}$ Verify that

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

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4. $A' = \begin{bmatrix} -3 & 1 \\ 2 & 1 \\ 0 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & -1 \end{bmatrix}$ Verify that

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

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5. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then verify that $A'A = I$

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6. If $A = \begin{bmatrix} 3 \\ 5 \\ 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 4 \end{bmatrix}$ find (AB)'

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7. If $\begin{bmatrix} 2x+y & 3y \\ 0 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 6 & 4 \end{bmatrix}$ then find x

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8. If $A = \begin{bmatrix} 1 & 2 \\ 6 & 5 \end{bmatrix} B = \begin{bmatrix} 2 & 5 \\ -3 & 4 \end{bmatrix}$, verify that (AB)' = B' A'

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9. If A $= \begin{bmatrix} 2 \\ -3 \\ 5 \end{bmatrix}, B = \begin{bmatrix} 2 & -4 & 7 \end{bmatrix}$, verify that (AB)' = B'A'

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10. If A = $\begin{bmatrix} -2 & 0 & 5 \\ 3 & 8 & 7 \end{bmatrix}, B = \begin{bmatrix} -1 & 0 \\ 2 & 3 \\ 1 & 4 \end{bmatrix}$, verify that (AB)' = B'A'

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11. Show that the matrix A = $\begin{bmatrix} 2 & 0 & -5 \\ 0 & 3 & 7 \\ -5 & 7 & 2 \end{bmatrix}$ is a symmetric matrix

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12. Show that the matrix A $= \begin{bmatrix} 0 & 3 & -5 \\ -3 & 0 & 7 \\ 5 & -7 & 0 \end{bmatrix}$ is a skew symmetric matrix

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13. For the matrix $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, verify that A + A' is a symmetric matrix

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14. For the matrix $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, verify that A - A' is a skew symmetric matrix

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15. Express $\begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix

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16. Using elementary transformations, find the inverse of each of the matrix, if it exists: $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$

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17. Using elementary transformations find the inverse of matrix $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

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18. By elementary transformation find the inverse of following

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

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19. By elementary transformation find the inverse of following

$$\begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$$

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Assignment Section V Long Answer Type Questions

1. Using elementary transformations find the inverse of the following matrice $\begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix}$

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2. using elementary find the inverse of the following matrice $\begin{bmatrix} -3 & 2 \\ -4 & 3 \end{bmatrix}$

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3. $A_\alpha = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ then prove that

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

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4. $A_\alpha = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ then prove that

$(A_\alpha^n = A(n\alpha) \quad \text{where} \quad n \in N$

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5. Prove that any square matrix can be expressed as sum of symmetric and skew symmetric matrix uniquely

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6. Express the following matrices as sum of a symmetric and a skew symmetric matrix

$$\begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$$

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7. Express the following matrices as sum of a symmetric and a skew symmetric matrix

$$\begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$$

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8. Express the following matrices as sum of a symmetric and a skew symmetric matrix

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

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Previous Years Board Questions For Practice M C Q

1. If $A = [2 \quad 1 \quad 3], B = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$ then AB equals

A. $[6 \quad 2 \quad 3]$

B. $\begin{bmatrix} 6 \\ 2 \\ 3 \end{bmatrix}$

C. [11]

D. none of these

Answer: C

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2. If $A = [2 \quad 3 \quad 1], B = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$, then AB equals

A. $[6 \quad 2 \quad 3]$

B. $\begin{bmatrix} 6 \\ 3 \\ 2 \end{bmatrix}$

C. [11]

D. none of these

Answer: C

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3. The matrix $A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ is

A. a unit matrix

B. a diagonal matrix

C. a symmetric matrix

D. a skew symmetric matrix

Answer: D

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4. The matrix $a = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ is

A. unit matrix

B. a diagonal matrix

C. a symmetric matrix

D. a skew symmetric matrix

Answer: D

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5. The number of all possible matrices of order 3×3 with each element 0 or 2 is :

A. 27

B. 18

C. 81

D. 512

Answer: D

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6. The number of all possible matrices of order 3×3 with each entry 0 or 3 is

A. 27

B. 18

C. 81

D. 512

Answer: D

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7. If A, B are symmetric matrices of same order, then AB - BA is a :

A. Skew symmetric matrix

B. Symmetric matrix

C. Zero matrix

D. Identity matrix

Answer: A

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8. If $A = [[321]]$, then AA' is equal to :

A. $\begin{bmatrix} 9 & 4 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 9 \\ 4 \\ 1 \end{bmatrix}$

C. [14]

D. [6]

Answer: C

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9. The matrix $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ is equal to:

A. a unit matrix

B. a diagonal matrix

C. a scalar matrix

D. none of these

Answer: D

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10. If $\begin{bmatrix} x+y & 8 \\ 2y & -6 \end{bmatrix} = \begin{bmatrix} 7 & 8 \\ 4 & -6 \end{bmatrix}$, then x equals

A. 6

B. 4

C. 5

D. 2

Answer: C

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11. If $\begin{bmatrix} 2x-y & 8 \\ 9 & y \end{bmatrix} = \begin{bmatrix} 6 & 8 \\ 9 & -2 \end{bmatrix}$, Then find the value of x and y .

A. 3

B. 6

C. -2

D. 2

Answer: D

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12. If A is a matrix of order 2×3 and B is matrix of order 3×3 then AB is matrix of order

A. 2×3

B. 3×2

C. 2×2

D. 3×3

Answer: C

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13. If matrix A is of order 4×3, then each row of matrix A contains elements :

A. 12

B. 4

C. 3

D. none of these

Answer: C

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14. Which of the given values of x and y make the following pair of matrices equal:

$$\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2 \\ 8 & 4 \end{bmatrix}$$

A. $x = -\frac{1}{3}, y = 7$

B. Not possible to find

C. $y = 7, x = -\frac{2}{3}$

D. $x = \frac{-1}{3}, y = \frac{-2}{3}$

Answer: B

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15. If AB = C, where B and C are matrices of order 3×5, then order of A is :

A. 3×3

B. 3×5

C. 5×5

D. 5×3

Answer: A

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Previous Years Board Questions For Practice

1. If A $= \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}, B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ verify that (AB)' = B' A'

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2. If $A = \begin{bmatrix} 1 \\ 3 \\ 6 \end{bmatrix}, B = \begin{bmatrix} 2 & 4 & 5 \end{bmatrix}$ then verify that (AB)' = B'A'

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3. Express the matrix A as sum of symmetric and skew symmetric matrix

$$A = \begin{bmatrix} 4 & 5 & 6 \\ -1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}$$

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4. By using elementary transformation find the inverse of matrix

$$A = \begin{bmatrix} 2 & 3 \\ -4 & 7 \end{bmatrix}$$

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5. By elementary transformation find the inverse of following

$$\begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$$

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6. Using elementary transformation find the inverse of

$$\begin{bmatrix} 2 & 3 \\ 3 & -2 \end{bmatrix}$$

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7. Show that A + A' is symmetric matrix where

$$A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$$

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8. If A and B are symmetric matrices of same order then $AB - BA$ is a :

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9. If $A = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$, find $-A^2 + 5A$

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10. If $A = \begin{bmatrix} 2 & -2 \\ -3 & 4 \end{bmatrix}$, find $-A^2 + 6A$

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11. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}, I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then Prove that $A^2 = A - 2I$

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12. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then find k so that $A^2 = 8A + kI$

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13. Find a 2×2 order matrix B such that $\begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix} B = \begin{bmatrix} 12 & 11 \\ 2 & 1 \end{bmatrix}$

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14. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 4 & 6 \end{bmatrix}$, then verify that (AB)' = B' A'

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15. If $A = \begin{bmatrix} 3 & 4 \\ 4 & 5 \end{bmatrix}, B = \begin{bmatrix} 5 & 3 \\ 2 & 1 \end{bmatrix}$ then verify that (AB)' = B' A'

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16. If A $= \begin{bmatrix} 2 & 4 \\ 3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 4 \\ 3 & 2 \end{bmatrix}$ then verify that (AB)' = B' A'

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17. Express the matrix $A = \begin{bmatrix} -2 & 3 & 1 \\ 1 & 3 & 2 \\ 5 & -4 & 5 \end{bmatrix}$ as the sum of a symmetric and skew - symmetric matrix

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18. Express the following as sum of symmetric and skew symmetric matrix

$$\begin{bmatrix} 2 & -2 & 4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$$

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19. Express the following as sum of symmetric and skew symmetric matrix

$$\begin{bmatrix} 2 & 4 & -6 \\ 7 & 3 & 5 \\ 1 & -2 & 4 \end{bmatrix}$$

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20. Express the following as sum of symmetric and skew symmetric matrix

$$\begin{bmatrix} -3 & 5 & 6 \\ -1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}$$

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21. Express the following as sum of symmetric and skew symmetric matrix

$$\begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$$

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22. By using elementary transformations, find the inverse of the matrix : $A = \begin{bmatrix} -5 & 4 \\ -6 & 5 \end{bmatrix}$

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23. Using elementary find the inverse of the following matrices

$$\begin{bmatrix} -6 & 5 \\ -7 & 6 \end{bmatrix}$$

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24. Using elementary transformations find the inverse of the matrix. $\begin{bmatrix} 1 & 3 & -2 \\ -3 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix}$

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25. Using elementary find the inverse of the following matrices

$$\begin{bmatrix} -4 & 3 \\ -5 & 4 \end{bmatrix}$$

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26. Using elementary find the inverse of the following matrices

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

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27. Using elementary find the inverse of the following matrices

$$\begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix}$$

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28. Find the values of a, b, c and d from the following equation : $\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$.

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29. Construct a 2×3 matrix whose elements in the ith row and jth column are given by $a_{ij} = \frac{(i+j)^2}{2}$

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30. Construct a 3×3 matrix whose elements are given by

$a_{ij} = 2i + j$

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31. Construct a 3×4 matrix whose elements are given by

$$a_{ij} = \frac{1}{2}[-3i + j]$$

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32. By using elementary transformation find the inverse of the matrix : $A = \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix}$

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33. Using elementary transformations, find the inverse of each of the matrix, if it exists: $\begin{bmatrix} 6 & -3 \\ -2 & 1 \end{bmatrix}$

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34. If $A = \begin{bmatrix} 6 & 2 \\ -1 & 3 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ show that $(A - 4I)(A - 5I) = 0$

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35. If $A = \begin{bmatrix} 7 & 2 \\ -1 & 4 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ show that $(A - 5I)(A - 6I) = 0$

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36. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ prove that (A - 2I) (A - 3I) = 0

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37. Find a 2×2 order matrix B such that $\begin{bmatrix} 2 & 5 \\ -3 & 7 \end{bmatrix} B = \begin{bmatrix} 17 & -1 \\ 47 & -13 \end{bmatrix}$

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38. Solve the matrix equation :

$$\begin{pmatrix} 1 & x & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 5 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} = (0)$$

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39. Solve the matrix equation :

$$\begin{pmatrix} 1 & x & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 5 \end{pmatrix} \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix} = (0)$$

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40. Solve the matrix equation :

$$\begin{pmatrix} 1 & 1 & x \end{pmatrix} \begin{pmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = (0)$$

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41. By using elementary transformation find the inverse of following

$$\begin{bmatrix} -3 & 2 \\ -4 & 3 \end{bmatrix}$$

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42. By using elementary transformation find the inverse of following

$$\begin{bmatrix} -4 & 3 \\ -5 & 4 \end{bmatrix}$$

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43. By using elementary transformation find the inverse of following

$$\begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$$

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44. By using elementary transformation find the inverse of following

$$\begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$$

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45. By using elementary transformation find the inverse of following

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

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46. Find the values of x, y and z from the following equation: $\begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$

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47. If $A = \begin{pmatrix} 11 & -25 \\ 4 & -9 \end{pmatrix}$, then prove by Mathematical Induction that : $A^n = \begin{pmatrix} 1+10n & -25n \\ n & 1-10n \end{pmatrix}$, where $n \in N$

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48. If $A = \begin{pmatrix} -1 & -4 \\ 1 & 3 \end{pmatrix}$, then prove by Mathematical Induction that : $A^n = \begin{pmatrix} 1-2n & -4n \\ n & 1+2n \end{pmatrix}$, where $n \in N$

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49. For a matrix $A = \begin{bmatrix} 6 & 2 \\ 4 & 5 \end{bmatrix}$, verify that

A + A' is a symmetric matrix

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50. For a matrix $A = \begin{bmatrix} 6 & 2 \\ 4 & 5 \end{bmatrix}$, verify that

A - A' is a skew symmetric matrix

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51. For the matrix $A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$, verify that : A + A' is a Symmetric Matrix

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52. For the matrix $A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$, verify that : A - A' is a Skew-Symmetric Matrix

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53. By using elementary transformation, find the inverse of the matrix

$$\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$$

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54. Using elementary transformations, find the inverse of each of the matrix, if it exists: $\begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix}$

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55. Using elementary transformation, find the inverse (if exists) of the following matrices

$\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

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56. Find the value of x and y when :

$$\begin{bmatrix} x+2y & 3y \\ 4x & 2 \end{bmatrix} = \begin{bmatrix} 0 & -3 \\ 8 & 2 \end{bmatrix}$$

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57. If A $= \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 & -6 \end{bmatrix}$, then verify that

(AB)' = B'A'

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58. For the matrices A and B, verify that $(AB)' = B'A'$, where : $A = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 5 & 7 \end{bmatrix}$

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59. By using elementary transformations, find the inverse of the matrix : $A = [[3, -1][-4, 2]]$

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60. By using elementary transformation find the inverse of the matrix : $A = \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix}$

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61. Using elementary transformations find the inverse of matrix $A = \begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$

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62. Construct a 2×3 matrix $A = [a_{ij}]$ whose elements are given by

$a_{ij} = \frac{-i}{j}$

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63. Construct a 2×2 matrix, $A = [a_ij]$ whose elements are given by:: $a_ij = \frac{(i+j)^2}{2}$

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64. Find X and Y, if $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

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65. Find matrices X and Y if : $X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$.

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66. For the matrix $A = \begin{pmatrix} 1 & 5 \\ 6 & 7 \end{pmatrix}$, verify that : A - A' is a Skew-Symmetric Matrix

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67. Using elementary transformations, find the inverse of each of the matrix, if it exists: $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

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68. Using elementary transformations find the inverse of the matrix. $\begin{bmatrix} 1 & 3 & -2 \\ -3 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix}$

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69. If $A = \begin{bmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \\ -2 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 1 & -5 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$,

then verify that $(A - B)' = A' - B'$

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