MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

MATRICES

Frequently Asked Question Examples

1. If matrix $A = \left[a_{ij}\right]_{3\times 2}$ and $a_{ij} = (3i - 2j)^2$, then find matrix A.

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2. If $\begin{bmatrix} x+y & 1 \\ 2y & 5 \end{bmatrix} = \begin{bmatrix} 7 & 1 \\ 4 & 5 \end{bmatrix}$ find 'x'

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3. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$ Then find the value of $x+y$

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

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

$[2a+ba-2b5c-d4c+3d] = [4-31124]$

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6. If $[9-14-213] = A + [12-1049]$, then find the matrix A.

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7. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 1 \\ 4 & 0 \end{bmatrix}, B = \begin{bmatrix} 6 & 2 \\ 1 & 3 \\ 0 & 4 \end{bmatrix}$, find the matrix C such that $A + B + C$ is a zero

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8. A company manufactures three kinds ofcalculators: A, B and C in its two factoriesI and II. The company has got an order form anufacturing at least 6400 calculators of kind A, 4000 of kind B and 4800 of kind C.The daily output of factory I is of 50 calculators of kind A, 50 calculators of kind Band 30 calculators of kind C. The daily out put of factory II is of40 calculators of kind A, 20 of kind B and 40 of kind C. The cost per day to run factory I is 12000 and of factory II is15000. How many days do the two factories have to be in operation to produce the order with the minimum cost? Formulate this problem as an LPP and solve it graphically.

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9. Find $x,\ y,\ z,\ t$ if $2[xzyt] + 3[1 - 102] = 3[3546]$.

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10. if $x\begin{bmatrix}2\\3\end{bmatrix} + Y\begin{bmatrix}-1\\1\end{bmatrix} = \begin{bmatrix}10\\5\end{bmatrix}$, find the values of X x and y.

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11. If $2\begin{bmatrix}3 & 4\\5 & x\end{bmatrix} + \begin{bmatrix}1 & y\\0 & 1\end{bmatrix} = \begin{bmatrix}7 & 0\\10 & 5\end{bmatrix}$ then

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12. Find the value of $x + y$ from the following equation:

$$2\begin{bmatrix}x & 5\\7y & -3\end{bmatrix} + \begin{bmatrix}3 & -4\\1 & 2\end{bmatrix} = \begin{bmatrix}7 & 6\\15 & -4\end{bmatrix}$$

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13. If $A = \begin{bmatrix} 8 & 0 \\ 4 & -2 \\ 3 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -2 \\ 4 & 2 \\ -5 & 1 \end{bmatrix}$ then find the matrix X, such that 2A+3X=5B

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14. Let $A = \text{diag } [3, -5, 7]$ and $B = \text{diag } [-1, 2, 4]$. ltbr. Find (i) (A+B) (ii) (A-B) (iii) -5A (iv) (2A+3B).`

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15. Find a matrix A such that $2A - 3B + 5C + O$, where $B = [-220314]$ and $C = [20 - 2716]$.

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16. Two farmers Ramkishan and Gurcharan Singh cultivates only three varieties of rice namely Basmati, Permal and Naura. The sale (in Rupees)

of these varieties of rice by both the farmers in the month of September and October are given by the followi

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17. If matrix $A = [1 \quad -1 \quad -11]$ and $A^2 = kA$, then write the value of k.

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18. If $[2357]\ [1 \quad -3 \quad -24] = [\ -46 \quad -9x]$, write the value of x

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19. If A is a square matrix such that $A^2 = I$, then find the simplified value of $(A - I)^3 + (A + I)^3 - 7A$.

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20. If A is a square matrix such that $A^2 = A$, then write the value of $7A - (I + A)^3$, where I is the identity matrix.

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21. Find matrix A such that

$$\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 \\ 1 & -2 \\ 9 & 22 \end{bmatrix}.$$

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22. Solved the following equation for x :

$$[\mathrm{x} \quad 1] \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = O$$

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23. compute the indicated products .

$(i)\begin{bmatrix} a & b \\ -b & a \end{bmatrix}\begin{bmatrix} a & -b \\ b & a \end{bmatrix}(ii)\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}\begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$

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

$(iv)\begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}\begin{bmatrix} 1 & -3 & 5 \\ 0 & 2 & 4 \\ 3 & 0 & 5 \end{bmatrix}$

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

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

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24. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ find 'k' so that $A^2 = 5A + kI.$

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25. If $A\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ and $A^3 - 6A^2 + 7A + kI_3 = O$ find k.

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26. If $A = [102021203]$, prove that $A^3 - 6A^2 + 7A + 2I = 0$

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27. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ -1 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 & -1 \\ 0 & 3 & 4 \\ 0 & -2 & -3 \end{bmatrix}$ Find AB and BA ?

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28. Show that If the product of two matrices is a zero matrix, it is not necessary that one of the matrices is a zero matrix.

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29. Give an example of two non-zero 2×2 matrices A and B such that $AB = O$.

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30. If $A = \begin{bmatrix} 3 & 4 \\ -4 & -3 \end{bmatrix}$, find f(A), where $f(x) = x^2 - 5x + 7$.

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31. If A=$\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ then by the method of mathematical induction prove that $A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$

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32. Matrix $A \begin{bmatrix} 0 & 2b & -2 \\ 3 & 1 & 3 \\ 3a & 3 & -1 \end{bmatrix}$ is gives to be symmetric, find values of 'a' and 'h'

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33. If the matrix $A = \begin{bmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{bmatrix}$ is skew symmetric, find the value of 'a' and 'b'.

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34. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, find $'\alpha'$ satisfy- ing $0 < \alpha < \frac{\pi}{2}$ when $A + A^{\tau} = \sqrt{2}I_2$, where A^{τ} is transpose of A.

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35. If $[a + b25b] = [6522]$, then find a.

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36. If $A = \begin{bmatrix} 3 & \sqrt{3} & 2 \\ 4 & 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$

then verify that :

(i) $(A')' = A$

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

(iii) $(kB)' = kB'$, where k is any constant.

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37. Show that $A + A'$ is symmetric when $A = \begin{bmatrix} 2 & 4 \\ 5 & 6 \end{bmatrix}$.

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38. Show that $A - A'$ is skew - symmetric when $A = \begin{bmatrix} 1 & 4 \\ 3 & 7 \end{bmatrix}$

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39. 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 verify that

$(i)(A+B)' = A' + B'(ii)(A_B)' = A - B'$

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

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41. If A and B are symmetric matrices of the same order, then show that AB is symmetric if and only if A and B commute, that is $AB = BA$.

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42. Find the values of $'x'$, $'y'$, $'z'$ if the matrix : $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ satisfies the equation $A'A = I$

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

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44. Express the following matrix as the sum of a symmetric and skew symmetric matrix, and verify your result: $(3 - 2 - 43 - 2 - 5 - 112)$

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Illustrative Examples

1. Using elementary transformations, find the inverse of the matrix $[1327]$

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2. Find P^{-1}, if it exists, given $P = [10 - 2 - 51]$.

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3. Find the inverse of the following matrix using elementary operations:

$A = (12 - 2 - 1300 - 21)$

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4. Find the inverse of the following matrix by using elementary transformations operation: $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

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5. If $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix}$, find the inverse of A, using elementary row transformations and hence solve the equation $XA = [1 \quad 0 \quad 1]$.

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Questions From Ncert Exemplar

1. Construct a matrix $A = \left[a_{ij}\right]_{2\times 2}$ whose elements a_{ij} are given by $a_{ij} = e^{2ix} \sin jx$.

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2. A matrix which is both symmetric as well as skew-symmetric is a null matrix.

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3. If $\begin{bmatrix} 2x & 3 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}\begin{bmatrix} x \\ 8 \end{bmatrix} = 0$, find 'x'

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4. If A is 3×3 invertible matrix, then show that for any scalar k (non-zero),kA is invertible and $(kA)^{-1} = \frac{1}{k}A^{-1}I$

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5. Let $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ .Then $A^2 - 4A + 7I =$

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Exercise 3 A Short Answer Type Questions

1. Consider the following information regarding the number of men and women workers in three factories. I, II and III. Men workers Women workers I 30 25 II 25 31 III 27 26 Represent the above information in the

form of 3×2 matrix. What does the entry in the third row and second column represent?

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

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3. If a matrix has 24 elements, what are the possible orders it can have? What, if it has 13 elements?

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4. Construst a 2×2 matrix ,A=$[a_{ij}]$, whose elements are given by :

$(i) a_{ij} = \frac{(i+j)^2}{2} (ii) a_{ij} = \frac{i}{j}$

$(iii) a_{ij} = \frac{(i+2j)^2}{2}$

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

$a_{ij} = \frac{2i - j}{3}$

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

$a_{ij} = \frac{(i + j)^2}{2}$

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7. Construst a 2×2 matrix ,A=[a_{ij}], whose elements are given by :

$(i) a_{ij} = \frac{(i + j)^2}{2} (ii) a_{ij} = \frac{i}{j}$

$(iii) a_{ij} = \frac{(i + 2j)^2}{2}$

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

$a_{ij} = \frac{1}{3}|(2i - 3j)|$

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9. Construct a 2×2 matrix $A = [a_{ij}]$ whose elements a_{ij} are given by: (i) $a_{ij} = i + j$ (ii) $a_{ij} = \frac{(i+j)^2}{2}$

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10. construct a $2 \times 3 \text{matrix} A = [a_{ij}]$, whose elements are give by $a_{ij} = \begin{cases} i - j, \geq j \\ i + j, < j \end{cases}$

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11. Construct a 3×2 matrix whose elements in the ith row and jth column are given by :

$a_{ij} = \frac{i + 4j}{2}$

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

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

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14. Construct a 3×3 matrix whose elements a_{ij} are given by

(i) $a_{ij} = i + j$ (ii) $a_{ij} = i \times j$ (iii) $a_{ij} = (i+j)^2$

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15. Construct a 3×4 matrix, $A = [a_{ij}]$ whose elements are given by: (ii) $a_{ij} = 2i - j$

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16. Find the value of 'x' and 'y' from the following matrix equation :

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

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17. find the values of x,y and zfrom the following equations :

$$(i) \begin{bmatrix} 4 & 3 \\ x & 5 \end{bmatrix} = \begin{bmatrix} y & z \\ 1 & 5 \end{bmatrix}$$

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

$$(iii) \begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$$

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18. Find the values of x,y and z from the following matrix equations :

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

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19. Find the values of x, y, and z from the following equations

$$\begin{bmatrix} x+y+a \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$$

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20. Find the value of a,b,c and d from the equation:

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

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21. यदि $\begin{bmatrix} x+3 & z+4 & 2y-7 \\ 4x+6 & a-1 & 0 \\ b-3 & 3b & z+2c \end{bmatrix} = \begin{bmatrix} 0 & 6 & 3y-2 \\ 2x & -3 & 2c+2 \\ 2b+4 & -21 & 0 \end{bmatrix}$ a, b, c, x, y तथा z का मान प्राप्त करे ।

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Exercise 3 B Short Answer Type Questions

1. If $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & -1 \\ 1 & 0 & -1 \end{bmatrix}$, find a matrix C such that

$(A + B + C)$ is a zero matrix.

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2. Given $X = \begin{bmatrix} 2 & 0 & 2 \\ 1 & 0 & -1 \end{bmatrix} Y = \begin{bmatrix} 3 & -1 & 0 \\ -2 & 0 & -1 \end{bmatrix}$, find Z such $X + Y + Z = O$

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3. Verify associative law of matrix additions for the matrices :

$A = \begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} 3 & 7 \\ 4 & 8 \end{bmatrix}$ and $C = \begin{bmatrix} -1 & 0 \\ 0 & 0 \end{bmatrix}$.

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4. यदि $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 2 \\ 1 & -3 & -1 \end{bmatrix}, B = \begin{bmatrix} 4 & 5 & 6 \\ -1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}$ तथा $C = \begin{bmatrix} -1 & -2 & 1 \\ -1 & 2 & 3 \\ -1 & -2 & 2 \end{bmatrix}$ $A + (B + C) = (A + B) + C$ को सत्यापित करे ।

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5. If A and B are two $m \times n$ matrices and O is the null matrix of the type $m \times n$, then show that

$A + B = O \Rightarrow A = -B$ and $B = -A$.

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Exercise 3 C Short Answer Type Questions

1. $A = \begin{bmatrix} \frac{2}{3} & 1 & \frac{5}{3} \\ \frac{1}{3} & \frac{2}{3} & \frac{4}{3} \\ \frac{7}{3} & 2 & \frac{2}{3} \end{bmatrix}$ and $B = \begin{bmatrix} \frac{2}{5} & \frac{3}{5} & 1 \\ \frac{1}{5} & \frac{2}{5} & \frac{4}{5} \\ \frac{7}{5} & \frac{6}{5} & \frac{2}{5} \end{bmatrix}$ then compute 3A-5B =

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2. Find the matrix X such that $2A - B + X = O$,

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

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3. X और Y ज्ञात कीजिए, यदि $X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$ है।

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4. 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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5. Find matrices '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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6. X का मान ज्ञात कीजिए यदि $Y = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ तथा $2X + Y \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$

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7. यदि $x \begin{bmatrix} 2 \\ 3 \end{bmatrix} + y \begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$ है, तो x तथा y के मान ज्ञात कीजिए।

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8. Find 'x' and 'y', if $2 \begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$

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9. Solve for x and y, if $2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 14 \\ 15 & 14 \end{bmatrix}$

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10. दिये गये समीकरण को x,y,z तथा t के लिए हल कीजिए यदि $2\begin{bmatrix} x & z \\ y & t \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix} = 3\begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$

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11. यदि $3\begin{bmatrix} x & y \\ z & w \end{bmatrix} = \begin{bmatrix} x & 6 \\ -1 & 2w \end{bmatrix} + \begin{bmatrix} 4 & x+y \\ z+w & 3 \end{bmatrix}$ है तो x, y, z तथा w के मानो को ज्ञात कीजिए।

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Exercise 3 C Long Answer Type Questions

1. If $A = \begin{bmatrix} 2 & -1 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 4 & 3 \\ -2 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} -2 & -3 \\ -1 & 2 \end{bmatrix}$, find each of the following :

(i) $2B + 3C$

(ii) $-2A + (B + C)$

(iii) $(2A - 3B) - C$

(iv) $A + (2B - C)$

(v) $A + (B + C)$

(vi) $(A + B) + C$.

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2. If $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 2 \\ 1 & -8 & -1 \end{bmatrix}, B = \begin{bmatrix} 4 & 5 & 6 \\ -1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}, C = \begin{bmatrix} -1 & -2 & 1 \\ -1 & 2 & 3 \\ -1 & -2 & 2 \end{bmatrix}$, find (i) $2B - 3C$ (ii) $A - 2B + 3C$.

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3. If

$A = \text{diag } [2, -5, 9], B = \text{diag } [-3, 7, 14]$ and $C = \text{diag } [4, -6, 3]$

, find:

(i) $A + 2B1$

(ii) $B + C - A$

(iii) $2A + B - 5C.$

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Exercise 3 D Short Answer Type Questions

1. If $P = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 2 & 1 \\ 2 & 3 & 0 \end{bmatrix}, Q = \begin{bmatrix} 1 & 2 \\ 3 & 0 \\ 4 & 1 \end{bmatrix}$, find PQ.

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2. If I is the identity matrix and A is a square matrix such that $A^2 = A$, then what is the value of $(I + A)^2 - 3A$?

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3. If $A = [10 - 17]$ and $I = [1001]$, then find k so that $A^2 = 8A + kI$

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

$A^2 = \begin{bmatrix} \cos 2hetha & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta \end{bmatrix}$

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5. If $A = \begin{bmatrix} 2 & -3 & 1 \\ -2 & 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 5 \\ 3 & 1 \\ 4 & 2 \end{bmatrix}$, then Find AB

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

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7. यदि $A = \begin{bmatrix} 5 & -1 \\ 6 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$

तो सिद्ध करे कि $AB \neq BA$

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8. Evaluate the following :

(i) $\begin{bmatrix} 4 \\ 5 \end{bmatrix} [7 \quad 9] + \begin{bmatrix} 4 & 0 \\ 0 & -5 \end{bmatrix}$

(ii) $[\mathrm{x} \ \mathrm{y} \ \mathrm{z}] \begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

(iii) $\begin{bmatrix} 1 & -1 \\ 0 & 2 \\ 2 & 3 \end{bmatrix} \left(\begin{bmatrix} 1 & 0 & 2 \\ 2 & 0 & 1 \end{bmatrix} - \begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 2 \end{bmatrix} \right).$

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9. If $[2x \quad 3] \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} x \\ 8 \end{bmatrix} = 0$, find 'x'

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10. for what values of x:

$$[1 \quad 2 \quad 1]\begin{bmatrix}1 & 2 & 0\\ 2 & 0 & 1\\ 1 & 0 & 2\end{bmatrix}\begin{bmatrix}0\\ 2\\ x\end{bmatrix} = 0?$$

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11. find x, if

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

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12. Find the values of 'a' and 'b' for which the following hold :

$$\begin{bmatrix}3 & 2\\ 7 & a\end{bmatrix}\begin{bmatrix}5 & -2\\ -7 & b\end{bmatrix} = \begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}.$$

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13. Let $A = \begin{bmatrix} 2 & 4 \\ 1 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 5 \\ 0 & 2 & 6 \end{bmatrix}$

(a) Find AB. (b) Is BA defined ? Justify your answer.

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

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15. Show that AB = BA in each of the following cases:

(i) $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ and $B = \begin{bmatrix} \cos\phi & -\sin\phi \\ \sin\phi & \cos\phi \end{bmatrix}$

(ii) $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & 2 \\ 1 & 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 10 & -4 & -1 \\ -11 & 5 & 0 \\ 9 & -5 & 1 \end{bmatrix}$

(iii) $A = \begin{bmatrix} 1 & 3 & -1 \\ 2 & 2 & -1 \\ 3 & 0 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 3 & -1 \\ -1 & 2 & -1 \\ -6 & 9 & -4 \end{bmatrix}$

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16. show that

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

$$(ii)\begin{bmatrix}1 & 2 & 3\\ 0 & 1 & 0\\ 1 & 1 & 0\end{bmatrix}\begin{bmatrix}-1 & 1 & 0\\ 0 & -1 & 1\\ 2 & 3 & 4\end{bmatrix} \neq \begin{bmatrix}-1 & 1 & 0\\ 0 & -1 & 1\\ 2 & 3 & 4\end{bmatrix}\begin{bmatrix}1 & 2 & 3\\ 0 & 1 & 0\\ 1 & 1 & 0\end{bmatrix}$$

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17. Show with the help of an example that $AB = O$ whereas $BA \neq O$, where O is a zero matrix and A,B are both non-zero matrices.

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18. Give an example of three matrices $A,\ B,\ C$ such that $AB = AC$ but $B \neq C$.

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19. If $A = \begin{bmatrix} 5 & 2 \\ -1 & 2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ show that :

$(A - 3I)(A - 4I) = O$

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20. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, then find $\left(A^2 - 5A\right)$

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Exercise 3 D Long Answer Type Questions I

1. Consider the matrices :

A=Consider the matrices :

$A = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

If $AB = \begin{bmatrix} 2 & 9 \\ 5 & 6 \end{bmatrix}$, find the values of a,b,c and d.

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2. Which relation is true for $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ -1 & 1 \end{bmatrix}$ (1) $(A+B)^2 = A^2 + 2AB + B^2$ (2) $(-B)^2 = A^2 - 2AB + B^2$ (3) AB=BA

(4) None of these

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3. If $A = \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix}, B = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$, verify that :

$(A+B)^2 \neq A^2 + 2AB + B^2$

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

prove that $(AB)C = A(BC)$

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5. Let $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$.

Calculate AC, BC and (A+B) C.

Also, verify that (A+B)C=AC+BC.

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6. Let $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}, C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$.

Calculate AC, BC and (A+B)C.

Also show that (A+B)C=AC+BC.

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7. Find the matrix X so that $X[123456] = [-7-8-9246]$

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

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9. If $A = [31 - 12]$, show that $A^2 - 5A + 7I = O$. Use this to find A^4

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10. Let $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ and $f(x) = x^2 - 5x + 6$, find f(A).

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11. यदि $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, तब $A^2 - 3A + 2I$ का मान ज्ञात कीजिए |

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12. if $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = 0$.

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13. If $M = \begin{bmatrix} 7 & 5 \\ 2 & 3 \end{bmatrix}$, then verify the equation :

$M^2 - 10M + 11I_2 = O$

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14. If $A + l = \begin{bmatrix} 2 & 2 & 3 \\ 3 & -1 & 1 \\ 4 & 2 & 2 \end{bmatrix}$ then show that $A^3 - 23A - 40l = 0$

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15. If $A = [102021203]$, prove that $A^3 - 6A^2 + 7A + 2I = 0$

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

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17. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then find f (A),

where $f(x) = x^2 - 5x + 7$.

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18. If $A = [10 - 17]$, find k such that $A^2 - 8A + kI = O$.

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19. If A $A = [3 - 24 - 2]$and $I = [1001]$, find k so that $A^2 = kA - 2I$.

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

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21. Solve system of linear equations, using matrix method,

$xy + 2z = 7 \qquad 3x + 4y \quad 5z = 5$

$2xy + 3 \; z = 12$

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22. Let $A = [0100]$show that $(aI + bA)^n = a^n I + na^{n-1} bA$, where I is the identitymatrix of order 2 and $n \in N$.

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23. A matrix X has $a + b$ rows and $a + 2$ columns while the matrix Y has $b + 1$ rows and $a + 3$ columns. Both matrices XY and YX exist. Find a and b. Can you say XY and YX are of the same type? Are they equal.

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24. Let $A = \begin{bmatrix} -1 & -4 \\ 1 & 3 \end{bmatrix}$, prove by Mathematical Induction that $A^n = \begin{bmatrix} 1-2n & -4n \\ n & 1+2n \end{bmatrix}$, where $n \in N$.

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25. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ then show that $A^n = \begin{bmatrix} \cos n\theta & -\sin n\theta \\ \sin n\theta & \cos n\theta \end{bmatrix}$

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26. If $A = [\cos\theta i \sin\theta i \sin\theta \cos\theta]$, then prove by principal of mathematical induction that

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27. A trust fund has Rs 30,000 that must be invested in two different types of bonds. The first bond pays 5% interest per year, and the second

bond pays 7% interest per year. Using matrix multiplication, determine how to divide Rs 30,000 among the tw

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28. There are 2 families A and B. There are 4 men, 6 women and 2 children is family A, and 2 men, 2 women and 4 children in family B. The recommend daily amount of calories is 2400 for men, 1900 for women, 1800 for children and 45 grams of proteins for men, 55 grams for women and 33 grams for children. Represent the above information using matrix. Using matrix multiplication, calculate the total requirement for calories and proteins for each of the two families. What awareness can you create among people about the planned diet from this question?

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Exercise 3 D Long Answer Type Questions Ii

1. Let $A = [23 \quad -12]$ and $f(x) = x^2 - 4x + 7$. Show that $f(A) = O$.

Use this result to find A^5.

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2. If $A = \begin{bmatrix} 0 & -\tan(\alpha/2) \\ \tan(\alpha/2) & 0 \end{bmatrix}$ and I is a 2×2 unit matrix, prove that

$$I + A(I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

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Exercise 3 E Short Answer Type Questions

1. If $A = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 2 & 3 & 4 \end{bmatrix}$ verify that $\frac{3}{4}A' = \left(\frac{3}{4}A\right)'$

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2. If matrix $A = (1\,2\,3)$, write $\forall$, where A' is the transpose of matrix A.

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3. Construct a 2×2 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = \frac{(i+2j)^2}{2}$.

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4. Show the $A = \frac{1}{3}\begin{bmatrix} -1 & 2 & -2 \\ -2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ is proper orthogonal matrix.

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5. 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 (i) (A+B)'=A'+B' (ii) (A-B)'=A'-B'

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6. 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 (i) (A+B)'=A'+B' (ii) (A-B)'=A'-B'

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7. If $A' = \begin{bmatrix} -2 & 3 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$, find $[A + 2B]'$.

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8. 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 verify that $(A + B)' = A' + B'$

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9. 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 verify that

$(i)(A+B)' = A' + B'(ii)(A_B)' = A - B'$

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

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11. If $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$, $B = [-6 \quad 7 \quad 10]$, verify that : $(AB)' = B'A'$

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

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13. If $A = \begin{bmatrix} 3 \\ -4 \\ 5 \end{bmatrix}$, $B = [6 \ \ 1 \ \ -1]$, verify that : $(AB)' = B'A'$.

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14. Show that the matrix $[[1, \ -15], [-1, 2, 1], [5, 1, 3]]$ is symmetric.

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15. Show that the matrix, $A = \begin{bmatrix} 0 & 1 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \end{bmatrix}$ is a skew - symmetric matrix.

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16. Show that the matrix $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$ is skew-symmetric.

HINT: Show that $A' = -A$.

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Exercise 3 E Long Answer Type Questions I

1. Show that $A + A^T$ is symmeric matrix, where A^T denotes the tranpose of A :

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

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2. Show that $A + A^T$ is symmeric matrix, where A^T denotes the tranpose of A :

$A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$

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3. Show that $A + A^T$ is symmeric matrix, where A^T denotes the tranpose of A :

$$A = \begin{bmatrix} 2 & 3 & -1 \\ 4 & 5 & 2 \\ 0 & 6 & 1 \end{bmatrix}$$

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4. Show that $A - A^T$ is skew - cymmetric matrix, where A^T denotes the transpose of A :

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

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5. Show that $A - A^T$ is skew - cymmetric matrix, where A^T denotes the transpose of A :

$$A = \begin{bmatrix} 6 & -8 \\ 7 & -9 \end{bmatrix}$$

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6. Show that $A - A^T$ is skew - cymmetric matrix, where A^T denotes the transpose of A :

$$A = \begin{bmatrix} 1 & 5 \\ 8 & 7 \end{bmatrix}$$

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7. Show that $A - A^T$ is skew - cymmetric matrix, where A^T denotes the transpose of A :

$$A = \begin{bmatrix} 4 & -1 & 2 \\ 3 & 0 & 5 \\ 6 & 1 & 3 \end{bmatrix}$$

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8. If

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 2 \\ 1 & -3 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & 5 & 6 \\ -1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}, C = [[-1, -21], [-1, 2, 3], [$$

find A-2B+3C. Also verify that (A+B)+C=A+(B+C).

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9. If (i) $A = [\cos\alpha \sin\alpha - \sin\alpha \cos\alpha]$, then verify that $A'A = I$.

(ii) $A = [\sin\alpha \cos\alpha - \cos\alpha \sin\alpha]$, then verify that $A'A = I$.

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10. If $A = \begin{bmatrix} \sin\alpha & \cos\alpha \\ -\cos\alpha & \sin\alpha \end{bmatrix}$, the prove that $A'A = I$.

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11. $A = \begin{bmatrix} -1 & 3 & 0 \\ -7 & 2 & 8 \end{bmatrix}, B = \begin{bmatrix} -5 & 0 \\ 0 & 3 \\ 1 & -8 \end{bmatrix}$. then AB

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12. $A = \begin{bmatrix} 3 & 4 \\ 4 & 5 \end{bmatrix}, B = \begin{bmatrix} 5 & 3 \\ 2 & 1 \end{bmatrix} then AB is?.$

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13. If $A = \begin{bmatrix} 5 & -1 \\ 6 & 7 \end{bmatrix}, B = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$, verify the following :

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

(iii) $(3A)' = 3A'$ (iv) $(AB)' = B'A'.$

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14. Let A be a square matrix. Then prove that AA^T and A^TA are symmetric matrices.

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15. Verify that : $A + A'$ is a Symmetric Matrix.

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16. Verify that : $A - A'$ is Skew - symmetric Matrix when :

(i) $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$ (ii) $A = \begin{bmatrix} 2 & 5 \\ 4 & 1 \end{bmatrix}$

(iii) $A = \begin{bmatrix} 6 & 2 \\ 4 & 5 \end{bmatrix}$ where A' is the tranpose of A.

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17. for the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that :

(I) (A+A') is a symmetric matrix.

(ii) (A-A') is a skew symmetric matrix.

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18. for the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that :

(I) (A+A') is a symmetric matrix.

(ii) (A-A') is a skew symmetric matrix.

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19. If $A = \begin{bmatrix} 3 & 1 & -1 \\ 0 & 1 & 2 \end{bmatrix}$, then show that AA' is a symmetric matrix.

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20. If $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$, $f \in d\frac{1}{2}(A + A')$ and $\frac{1}{2}(A - \forall')$

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

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22. Express $\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ as the sum of symmetric and skew-symmetric matrices.

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23. Prove that diagonal elements of a skew symmetric matrix are all zeroes.

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24. Show that the matrix $B^T AB$ is symmetric or skew-symmetric according as A is symmetric or skew-symmetric.

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25. Let A and B be symmetric matrices of the same order. Then show that : $A + B$ is a symmetric matrix

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26. Let A and B be symmetric matrices of the same order. Then show that :

$AB - BA$ is skew - symmetric matrix

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27. If A and B are symmetric matrices of the same order, show that AB+BA is symmetric.

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Exercise 3 E Long Answer Type Questions Ii

1. Express the following as the sum of symmetric and skew - symmetric matrices :

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

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2. Express the following as the sum of symmetric and skew - symmetric matrices :

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

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3. Expressing the following matrices as the sum of a symmetric and skew symmetric matrix : $\begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$

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4. Express the following as the sum of symmetric and skew - symmetric matrices :

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

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5. Express the following as the sum of symmetric and skew - symmetric matrices :

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

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

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

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7. Express the following as the sum of symmetric and skew - symmetric matrices :

$$\begin{bmatrix} 1 & 2 & -3 \\ 7 & 0 & 5 \\ -4 & 8 & 9 \end{bmatrix}$$

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8. Express the following as the sum of symmetric and skew - symmetric matrices :

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

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9. Express the following as the sum of symmetric and skew - symmetric matrices :

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

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Exercise 3 F Short Answer Type Questions

1. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

$$\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$$

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2. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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3. Find the inverse of the following matrices, if it exists, using elementary operation: $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

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4. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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5. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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6. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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7. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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8. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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9. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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10. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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11. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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12. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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13. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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14. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

$$\begin{bmatrix} -5 & 4 \\ -6 & 5 \end{bmatrix}$$

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15. Find the inverse of the following , if it exists, by using elementary row (column) transformations :

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

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Exercise 3 F Long Answer Type Questions I

1. Using elementary transformations (operations), find the inverse of the following matrices, if it exits $\begin{bmatrix} 2 & -1 & 3 \\ -5 & 3 & 1 \\ -3 & 2 & 3 \end{bmatrix}$

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2. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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3. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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4. Using elementary transformations, find the inverse of the matrix $[2 - 332233 - 22]$

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5. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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6. Find the inverse of the following matrix by using elementary transformations operation: $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

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7. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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8. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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9. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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10. Find the inverse of the following, if it exists, using elementary row (column) transformations :

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

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Exercise 3 F Long Answer Type Questions Ii

1. Find the inverse of the following matrix using elementary operations:

$A = (12 - 2 - 1300 - 21)$

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Objective Type Questions A Multiple Choice Questions

1. If $A = [a_{ij}]_{m \times n}$ is a square matrix, if :

A. $m < n$

B. $m > n$

C. $m = n$

D. None of these.

Answer: C

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2. 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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3. 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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4. Assume X, Y, Z, W and P are matrices of order $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ and $p \times k$, respectively. Choose the correct answer The restriction on n, k and p so that $PY + WY$ will be defined are: (A) $k = 3, p = n$ (B)

A. $k = 3, p = n$

B. k is arbitrary $p = 2$

C. p is arbitrary

D. $k = 2, p - 3.$

Answer: A

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5. If $n = p$, then the order of the matrix $7X - 5Z$ is: (A) $p \times 2$ (B) $2 \times n$ (C) $n \times 3$ (D) $p \times n$

A. $p \times 2$

B. $2 \times n$

C. $n \times 3$

D. $p \times n$

Answer: B

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6. If A,B are symmetric matrices of same order, them $AB - BA$ is a :

A. Skew - symmetric matrix

B. Symmetric matrix

C. Zero matrix

D. Identity matrix.

Answer: A

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7. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ then $A + A' = I$, 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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8. Matrices A and B will be inverse of each other only if (A) $AB = BA$ (B) $AB = BA = 0$ (C) $AB = 0, BA = I$ (D) $AB = BA = I$

A. $AB = BA$

B. $AB - BA = O$

C. $AB = O, BA = I$

D. $AB = BA = I.$

Answer: D

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9. If $A = [\alpha\beta\gamma\alpha]$is such that $A^2 - I$, then(A) $1 + \alpha^2 + \beta\gamma = 0$ (B) $1 - \alpha^2 + \beta\gamma = 0$ (C) $1 - \alpha^2 - \beta\gamma = 0$ (D) $1 + \alpha^2 - \beta\gamma = 0$

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

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

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

D. $1 + \alpha^2 - \beta\gamma = 0$

Answer: C

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10. If a matrix A is both symmetric and skew-symmetric, then A is a diagonal matrix (b) A is a zero matrix (c) A is a scalar matrix (d) A is a square matrix

A. A is a diagonal matrix

B. A is a zero matrix

C. A is a square matrix

D. None of these

Answer: B

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11. If A is a square matrix such that $A^2 = A, then (I + A)^3 - 7A$ is equal to A (b) $I - A$ (c) I (d) $3A$

A. A

B. $I - A$

C. I

D. 3A

Answer: C

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12. The matrix $A = \begin{bmatrix} 0 & 0 & 5 \\ 0 & 5 & 0 \\ 5 & 0 & 0 \end{bmatrix}$ is a :

A. scalar matrix

B. diagonal matrix

C. unit matrix

D. square matrix

Answer: D

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13. If matrix $A = [a_{ij}]_{2\times 2}$, where $a_{ij} = 1$ if $i \neq j$

$= 0$ if $i = j$ then A^2 is equal to :

A. I

B. A

C. O

D. None of these.

Answer: A

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14. If $A = \frac{1}{\pi}\left[\sin^{-1}(\pi x)\tan^{-1}\left(\frac{x}{\pi}\right)\sin^{-1}\left(\frac{x}{\pi}\right)\cot^{-1}(\pi x)\right]$ and $B = \frac{1}{\pi}\left[-\cot^{-1}(\pi x)\tan^{-1}\left(\frac{x}{\pi}\right)\sin^{-1}\left(\frac{x}{\pi}\right) - \tan^{-1}(\pi x)\right]$, then $A - B$ is equal to I (b) 0 (c) $2I$ (d) $\frac{1}{2}I$

A. I

B. O

C. 2I

D. $\frac{1}{2}I$.

Answer: D

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15. If A is a matrix of order $m \times n$ and B is a matrix such that AB^T and $B^T A$ are both defined, then the order of matrix B is $m \times n$ (b) $n \times n$ (c) $n \times m$ (d) $m \times n$

A. $m \times m$

B. $n \times n$

C. $n \times m$

D. $m \times n$.

Answer: D

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16. For any two matrices A and B , we have

A. $AB = BA$

B. $AB \neq BA$

C. $AB = O$

D. None of these

Answer: D

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17. Suppose P and Q are two different matrices of order $3 \times n$ and $n \times p$, then the order of the matrix $P \times Q$ is ?

A. $3 \times p$

B. $p \times 3$

C. $n \times n$

D. 3×3

Answer: A

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

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

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

C. π

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

Answer: B

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19. If a matrix A is both symmetric and skew-symmetric, then A is a diagonal matrix (b) A is a zero matrix (c) A is a scalar matrix (d) A is a square matrix

A. A is a diagonal matrix

B. A is a zero matrix

C. A is a square matrix

D. None of these.

Answer: B

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20. For any square matrix A, $(A - A')$ is :

A. Symmetric matrix

B. Skew-symmetric matrix

C. Scalar matrix

D. Zero matrix

Answer: B

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21. 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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22. If $A = \begin{bmatrix} 4 & 2 & 3 \\ 1 & 5 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 & 7 \\ 0 & 4 & 1 \end{bmatrix}$, then $2A + B$ is :

A. $\begin{bmatrix} 9 & 7 & 13 \\ 2 & 14 & 15 \end{bmatrix}$

B. $\begin{bmatrix} 9 & 13 & 7 \\ 2 & 14 & 13 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 9 & 13 \\ 2 & 14 & 15 \end{bmatrix}$

D. None of these.

Answer: A

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23. If order of matrix A is 2×3 and order of matrix B is 3×5, then order of matrix $B'A'$ is :

A. 5×2

B. 2×5

C. 5×3

D. 3×2

Answer: A

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24. If A and B are invertible matrices of the same order, then $(AB)^{-1}$ is equal to :

A. BA

B. $B^{-1}A$

C. BA^{-1}

D. $B^{-1}A^{-1}$.

Answer: D

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25. If the matrices $\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix} = \begin{bmatrix} 5 & y-2 \\ 8 & 4 \end{bmatrix}$, then the values of x and y are :

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

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

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

D. $x = 5, y = -\frac{2}{3}$.

Answer: C

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26. Let $A = \begin{bmatrix} 0 & 2 \\ 0 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 0 & 0 \end{bmatrix}$, then AB equals :

A. $\begin{bmatrix} 0 & 6 \\ 0 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 4 \\ 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 6 \\ 0 & 4 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

Answer: D

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27. If A is square matrix such that $|A| \neq 0$ and $A^2 - A + 2I = O$ then A^{-1}=?

A. $I - A$

B. $\frac{1}{2}(I - A)$

C. $\frac{1}{2}(I + A)$

D. $I + A$

Answer: B

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28. The value of 'k' such that the matrix $\begin{pmatrix} 1 & k \\ -k & 1 \end{pmatrix}$ is symmetric is :

A. 0

B. 1

C. -1

D. 2

Answer: A

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Objective Type Questions B Fill In The Blanks

1. If $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$, then value of y is ____.

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2. If A is any $m \times n$ matrix such that AB and BA are both defined, then B is a matrix of order

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3. A doagonal matrix is said to be _____. If its diagonal elements are equal (other than unity).

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4. For a 2×2 matrix, $A = [a_{ij}]$, whose elements are given by $a_{ij} = \frac{i}{j}$, then $a_{12} =$ _____.

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

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6. If A is a square matrix of order m, and if there exists another square matrix B of the same order m, such that $AB = BA = I$, then B is called the _____.

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7. If A is order $m \times n$ and B is also of order $m \times n$ then $(A + B)$ is a matrix of order _____.

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8. If $(5 \ \text{x} \ 1)\begin{pmatrix} 4 \\ 2 \\ 7 \end{pmatrix} = (35)$, then x = _____.

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9. If A is any $m \times n$ matrix such that AB and BA are both defined, then B is a matrix of order

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10. For any matrix A, $A - A'$ is _____ matrix.

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Objective Type Questions C True False Questions

1. If A is of order $m \times n$ and B is of order $n \times p$, then AB is a matrix of order $m \times p$.

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2. If $A = \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$ and $A^2 = \lambda A$, then $\lambda = 4$

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3. If A and B are any two matrices of the same order, then (AB)=A'B'

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4. Prove that the transpose of $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ is $\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$.

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Objective Type Questions D Very Short Answer Type Questions

1. If I is identify matrix of order two, then 3I would be which matrix ?

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

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3. Name the square matrix $A = [a_{ij}]$ in which $a_{ij} = 0, i \neq j$.

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4. Write the element a_{12} of the matrix $A = [a_{ij}]_{2\times 2}$, whose elements a_{ij} are given by $a_{ij} = e^{2ix} \sin jx$.

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5. Find the values 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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6. Write the value $x - y + z$ 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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7. If $3A - B = \begin{bmatrix} 5 & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$ the find the matrix A.

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

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9. If $A = \begin{bmatrix} 2 & -1 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 4 & 3 \\ -2 & 1 \end{bmatrix}, C = \begin{bmatrix} -2 & -3 \\ -1 & -2 \end{bmatrix}$, find the value of $A + B + C$.

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10. Does the sum $\begin{bmatrix} 5 & 3 & 2 \\ 2 & 5 & 3 \\ 5 & 2 & 3 \end{bmatrix} + \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ make sense ?

If so, find the sum and if not, give the reason.

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

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12. Find 'x' and 'y' if $2\begin{bmatrix} X & 5 \\ 3 & y \end{bmatrix} = \begin{bmatrix} 4 & 10 \\ 6 & 6 \end{bmatrix}$.

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13. From the equation : $2\begin{pmatrix} 1 & 3 \\ 0 & x \end{pmatrix} + \begin{pmatrix} y & 0 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 5 & 6 \\ 1 & 8 \end{pmatrix}$ find

x and y

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14. From the equation : $2\begin{pmatrix} 1 & 3 \\ 0 & x \end{pmatrix} + \begin{pmatrix} y & 0 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 5 & 6 \\ 1 & 8 \end{pmatrix}$ find

$x - y$

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15. Write the order of the product matrix :

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} [2 \quad 3 \quad 4]$$

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16. Compute : $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$

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17. Compute : $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$

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18. Compute : $\begin{bmatrix} 4 \\ 2 \\ 3 \end{bmatrix} [1 \quad 0 \quad 2]$

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19. Compute : $\begin{bmatrix}1 & 2 & 3 & 4\end{bmatrix}\begin{bmatrix}1\\2\\3\\4\end{bmatrix}$.

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20. For the symmetric matrix, $A = \begin{bmatrix}2 & x & 4\\5 & 3 & 8\\4 & y & 9\end{bmatrix}$ find the values of 'x' and 'y'

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21. If A is a matrix of order 3×4 and B is a matrix of order 4×5, what is the order of the matrix $(AB)^T$?

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22. For what value of 'x', is the matrix , $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ a skew - symmetric matrix

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23. $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ and $A + A^T = I$, find the value of α.

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Ncert File Question From Ncert Book Exercise 3 1

1. in the matrix $a = \begin{bmatrix} 2 & 5 & 19 & -7 \\ 35 & -2 & \frac{5}{2} & 12 \\ \sqrt{3} & 1 & -5 & 17 \end{bmatrix}$, write:

(i) the order of the matrix,

(ii) the number of elements ,

(iii) write the elements ,$a_{13}, a_{21}, 1_{33}, 1_{24}, a_{23}$.

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2. If a matrix has 24 elements , what are the possible orders it can have?

What if it has 13 elements?

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3. If a matrix has 18 elements, what are the possible orders it can have ?

What, if it has 5 elements ?

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4. Construst a 2×2 matrix ,A=$[a_{ij}]$, whose elements are given by :

$(i) a_{ij} = \frac{(i+j)^2}{2} (ii) a_{ij} = \frac{i}{j}$

$(iii) a_{ij} = \frac{(i+2j)^2}{2}$

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5. Construct a 3×4matrix, whose elements are given by:(i) $a_{ij} = \frac{1}{2}|-3i+j|$ (ii) $a_{ij} = 2i - j$

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6. Construct a 3×4 matrix, whose elements are given by :

$a_{ij} = 2i - j$

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7. find the values of x,y and zfrom the following equations :

$(i)\begin{bmatrix} 4 & 3 \\ x & 5 \end{bmatrix} = \begin{bmatrix} y & z \\ 1 & 5 \end{bmatrix}$

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

$(iii)\begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$

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8. $A = [a_{ij}]_{m \times n}$ is a square matrix, if

A. $m < n$

B. $m > n$

C. $m = n$

D. None of these.

Answer: C

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9. Which of the given values of x and y make the following pair of matrices equal $\begin{bmatrix} 3x+2 & 5 \\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2 \\ 8 & 4 \end{bmatrix}$:

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: C

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10. 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

A. 27

B. 18

C. 81

D. 512

Answer: D

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Ncert File Question From Ncert Book Exercise 3 2

1. $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}, C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$

find each of the following :

(i) A+B (ii) A-B

(iii) 3A-C (iv) AB

(V) BA

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2. compute the following :

$(i) \begin{bmatrix} a & b \\ -b & a \end{bmatrix} + \begin{bmatrix} a & b \\ b & a \end{bmatrix}$

$(ii) \begin{bmatrix} a^2+b^2 & b^2+c^2 \\ a^2+c^2 & a^2+b^2 \end{bmatrix} + \begin{bmatrix} 2ab & 2bc \\ -2ac & -2ab \end{bmatrix}$

$(iii) \begin{bmatrix} -1 & 4 & -6 \\ 8 & 5 & 16 \\ 2 & 8 & 5 \end{bmatrix} + \begin{bmatrix} 12 & 7 & 6 \\ 8 & 0 & 5 \\ 3 & 2 & 4 \end{bmatrix}$

$(iv) \begin{bmatrix} \cos^2 x & \sin^2 x \\ \sin^2 x & \cos^2 x \end{bmatrix} + \begin{bmatrix} \sin^2 & \cos^2 x \\ \cos^2 x & \sin^2 x \end{bmatrix}$

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3. Compute the indicated products

(i) $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

(ii) $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}\begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$

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

(iv) $\begin{bmatrix} 3 & -1 & 3 \\ -1 & 0 & 2 \end{bmatrix}\begin{bmatrix} 2 & -3 \\ 1 & 0 \\ 3 & 1 \end{bmatrix}$.

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4.

if $A = \begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix}, B = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}$ and $c = \begin{bmatrix} 4 & 1 & 2 \\ 0 & 3 & 2 \\ 1 & -2 & 3 \end{bmatrix}$,

then compure (A+B) and (B-C), Also , verify that A+(B-C)=(A+B)-C.`

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5. $A = \begin{bmatrix} \frac{2}{3} & 1 & \frac{5}{3} \\ \frac{1}{3} & \frac{2}{3} & \frac{4}{3} \\ \frac{7}{3} & 2 & \frac{2}{3} \end{bmatrix}$ and $B = \begin{bmatrix} \frac{2}{5} & \frac{3}{5} & 1 \\ \frac{1}{5} & \frac{2}{5} & \frac{4}{5} \\ \frac{7}{5} & \frac{6}{5} & \frac{2}{5} \end{bmatrix}$ then compute 3A-5B =

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6. $\cos\theta \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} \sin\theta & \cos\theta \\ -\cos\theta & \sin\theta \end{bmatrix} = ?$

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7. Find X and Y, if(i) $X + Y = [7025]$and $X - Y = [3003]$(ii) $2X + 3Y = [2340]$and $3X + 2Y = [2 - 2 - 15]$

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8. Find X if $Y = [3214]$ and $2X + Y = [10 - 32]$.

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9. Find X and Y,if

$$2\begin{bmatrix}1 & 3\\ 0 & x\end{bmatrix}+\begin{bmatrix}y & 0\\ 1 & 2\end{bmatrix}=\begin{bmatrix}5 & 6\\ 1 & 8\end{bmatrix}$$

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10. Find $x,\ y,\ z,\ t$ if $2[xzyt]+3[1-102]=3[3546]$.

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11. If $x[23]+y[-11]=[105]$, find the values of x and y.

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12. Given $3[xyzw]-[x6-12w]+[4x+yz+w3]$, find the values of x, y, z and w.

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13. If $F(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ six & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$, show that $F(x).\, F(y) = F(x+y)$.

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14. Show that

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

(ii) $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 2 & 3 & 4 \end{bmatrix} \neq \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 2 & 3 & 4 \end{bmatrix}\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$.

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15. Find $A^2 - 5A + 6I$, if $A = [2012131 - 10]$

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16. If $A = [102021203]$, prove that $A^3 - 6A^2 + 7A + 2I = 0$

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

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18. Let $A = [0 - \tan(\alpha/2)\tan(\alpha/2)0]$ and I be the identity matrix of order 2. Show that $I + A = (I - A)[\cos\alpha - \sin\alpha\sin\alpha\cos\alpha]$.

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19. A trust fund has Rs 30,000 that must be invested in two different types of bonds. The first bond pays 5% interest per year, and the second bond pays 7% interest per year. Using matrix multiplication, determine how to divide Rs 30,000 among the tw

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20. The bookshop of a particular school has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economics books. Their selling prices are Rs 80, Rs 60 and Rs 40 each respectively. Find the total amount the bookshop will receive from selling all

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Ncert File Question From Ncert Book Exercise 3 2 Choose The Correct Answer

1. Assume X, Y, Z, W and P are matrices of order $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ and $p \times k$, respectively. Choose the correct answer The restriction on n, k and p so that $PY + WY$ will be defined are: (A) $k = 3, p = n$ (B)

A. $k = 3, p = n$

B. k si arbitrary, $p = 2$

C. p is arbitrary, $k = 3$

D. $k = 2, p = 3.$

Answer: A

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2. If $n = p$, then the order of the matrix $7X - 5Z$ is :

A. $p \times 2$

B. $2 \times n$

C. $n \times 3$

D. $p \times n$

Answer: B

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Ncert File Question From Ncert Book Exercise 3 3

1. Find the transpose of each of the following matrices :

(i) $\begin{bmatrix} 5 \\ \frac{1}{2} \\ -1 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ (iii) $\begin{bmatrix} -1 & 5 & 6 \\ \sqrt{3} & 5 & 6 \\ 2 & 3 & -1 \end{bmatrix}$.

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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 (i) (A+B)'=A'+B' (ii) (A-B)'=A'-B'

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3. 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 verify that

$(i)(A+B)' = A' + B' (ii)(A_B)' = A - B'$

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

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5. For the matrices A and B, verify that $(AB)' = B'A'$, where(i) $A = [1 - 43], B = [-121]$ (iii) $A = [012], B = [157]$

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6. If (i) $A = [\cos\alpha \sin\alpha - \sin\alpha \cos\alpha]$, then verify that $A'A = I$.

(ii) $A = [\sin\alpha \cos\alpha - \cos\alpha \sin\alpha]$, then verify that $A'A = I$.

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

Show that the matrix $A = \begin{bmatrix} 0 & 1 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \end{bmatrix}$ is a skew symmetric matrix

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8. for the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that :

(I) (A+A') is a symmetric matrix.

(ii) (A-A') is a skew symmetric matrix.

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9. If $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$ find $\frac{1}{2}(A + A')$ and $\frac{1}{2}(A - A')$

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10. Express the following matrices as the sum of a symmetric and a skew symmetricmatrix:(i) $[351 - 1]$ (ii) $[6 - 22 - 23 - 12 - 13]$ (iii) $[33 - 1 - 2 - 21452]$ (iv) $[15 - 12]$

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Ncert File Question From Ncert Book Exercise 3 3 Choose The Correct Answer In The Exercises

1. Choose the correct answer 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

A. Skew symmetric matrix

B. symmetric matrix

C. Zero matrix

D. Identity matrix.

Answer: A

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2. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then $A + A' = I$, if 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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Ncert File Question From Ncert Book Exercise 3 4

1. Using elementary transformations, find the inverse of each of the matrices,

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

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2. Using elementary transformations, find the inverse of each of the matrices,

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

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3. Using elementary transformations, find the inverse of each of the matrices,

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

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4. Using elementary transformations, find the inverse of each of the matrices,

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

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5. Using elementary transformations, find the inverse of,

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

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6. Using elementary transformations, find the inverse of each of the matrices,

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

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7. Using elementary transformations, find the inverse of the matrix $[3 - 1 - 42]$

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8. Using elementary transformations, find the inverse of each of the matrices $[2 - 61 - 2]$

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9. Using elementary transformations, find the inverse of each of the matrices,

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

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10. Using elementary transformations, find the inverse of each of the matrices,

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

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11. Using elementary transformations, find the inverse of the matrix $[2 - 332233 - 22]$

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12. Using elementary transformations, find the inverse of the matrix $[13 - 2 - 30 - 5250]$

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13. Using elementary transformations, find the inverse of the matrix : $(20 - 1510013)$

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14. Matrices A and B will be inverse of each other only if (A) $AB = BA$ (B) $AB = BA = 0$ (C) $AB = 0, BA = I$ (D) $AB = BA = I$

A. $AB = BA$

B. $AB = BA = O$

C. $AB = O, BA = I$

D. $AB = BA = I.$

Answer: D

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Miscellaneous Exercise On Chapter 3

1. Let $A = [0100]$ show that $(aI + bA)^n = a^n I + na^{n-1}bA$, where I is the identitymatrix of order 2 and $n \in N$.

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2. If $A = [111111111]$, prove that $A^n = \left[3^{n-1}3^{n-1}3^{n-1}3^{n-1}3^{n-1}3^{n-1}3^{n-1}3^{n-1}3^{n-1}\right], n \in N.$

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3. If $A = [3 - 41 - 1]$, then prove that $A^n = [1 + 2n - 4 \cap 1 - 2n]$, where n is any positive integer.

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4. If A and B are symmetric matrices, prove that AB BA is a skew symmetric matrix.

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5. Show that the matrix $B^T AB$ is symmetric or skew-symmetric according as A is symmetric or skew-symmetric.

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6. Find the values of x,y,z if the matrix $A = \begin{bmatrix} 0 & 3y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ satisfy the equation $A'A = I$.

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7. for what values of x:

$$[1 \quad 2 \quad 1]\begin{bmatrix}1 & 2 & 0\\ 2 & 0 & 1\\ 1 & 0 & 2\end{bmatrix}\begin{bmatrix}0\\ 2\\ x\end{bmatrix} = 0?$$

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8. if $A = \begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$, show that $A^2 - 5A + 7I = 0.$

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9. A manufacturer produces three products x, y, z which he sells in two markets. Annual sales are indicated below: Market Products I 10.000 2.000 18.000 II 6.000 20.000 8.000 (a) If unit sale prices of x, y and z are Rs 2.50, Rs 1.50 and Rs 1.0

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10. Find the matrix X so that $X[123456] = [-7-8-9246]$

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11. If A and B are square matrices of the same order such that $AB = BA$, then proveby 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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12. If $A = \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is such that $A^2 = I$, then :

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

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

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

D. $1 + \alpha^2 - \beta\gamma = 0.$

Answer: C

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13. If the matrix A is both symmetric and skew symmetric, then (A) A is a diagonal matrix (B) A is a zero matrix (C) A is a square matrix (D) None of these

A. A is a diagonal matrix

B. A is zero matrix

C. A is a square matrix

D. None of these

Answer: B

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14. If A is a square matrix such that $A^2 = A, then (I + A)^3 - 7A$ is equal to A (b) $I - A$ (c) I (d) $3A$

A. A

B. $I - A$

C. I

D. 3A.

Answer: C

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Exercise

1. If a matrix has 24 elements, what are the possible orders it can have? What, if it has 13 elements?

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2. Comstruct $a_{2\times 2}$ matrix, where $a_{ij} = I - 2i + 3j|$.

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3. If $XandY$ are $2x2$ matrices, then solve the following matrix equations for $XandY \cdot 2X + 3Y = [2340], 3X + 2y = [-221-5]$

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4. If A is a square matrix such that $A^2 = A$, show that $(I + A)^3 = 7A + I$.

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5. The matrix $\begin{bmatrix} 0 & 0 & 5 \\ 0 & 5 & 0 \\ 5 & 0 & 0 \end{bmatrix}$ is a scalar matrix.

State true of false. If false then what type of matrix is this ?

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6. Find the non-zero values of x satisfying the matrix equation

$$x\begin{bmatrix}2x & 2\\ 3 & x\end{bmatrix}, 2\begin{bmatrix}8 & 5x\\ 4 & 4x\end{bmatrix} = 2\begin{bmatrix}x^2+8 & 24\\ 10 & 6x\end{bmatrix}$$

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7. Express the matrix $\begin{bmatrix}2 & 4 & -6\\ 7 & 3 & 5\\ 1 & -2 & 4\end{bmatrix}$ as a sum of symmetric and a skew - symmetric matrix.

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Revision Exercise

1. Let $A - [2 - 134], B - [5274], C - [2538]$. Find a matrix D such that

$CD - AB = 0$

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2. If A and B are square matrices of the same order such that AB=BA, then (A) $(A-B)(A+B)=A^2-B^2$ (B) $(A+B)^2=A^2+2AB+B^2$ (C) $(A+B)^3=A^3A^2B+3AB^2+B^3$ (D) $(AB)^2=A^2B^2$

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3. If $A_\alpha=[\cos\alpha\sin\alpha-\sin\alpha\cos\alpha]$, then prove that $A_\alpha A_\beta=A_{\alpha+\beta}$ for every positive integer n .

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4. A manufacturer produces three products x, y, z which he sells in two markets. Annual sales are indicated below: Market Products I 10.000 2.000 18.000 II 6.000 20.000 8.000 (a) If unit sale prices of x, y and z are Rs 2.50, Rs 1.50 and Rs 1.0

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5. Show that $\left(\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ omwga^2 & 1 & \omega \end{bmatrix} + \begin{bmatrix} \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \\ \omega & \omega^2 & 1 \end{bmatrix}\right)\begin{bmatrix} 1 \\ \omega \\ \omega^2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

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6. If $A(x) = \frac{1}{\sqrt{1-x^2}}\begin{bmatrix} 1 & -x \\ -x & 1 \end{bmatrix}$, prove that : $A(x)A(y) = A\begin{pmatrix} x+y \\ 1+xy \end{pmatrix}$, where $|x| < 1$.

Hence, deduce that $(A(x))^{-1} = A(-x)$.

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7. If $A = \begin{bmatrix} a & b \\ 0 & 1 \end{bmatrix}$ then prove that $A^n = \begin{bmatrix} a^n & \frac{b(a^n-1)}{a-1} \\ 0 & 1 \end{bmatrix}$

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8. Let A be a square matrix and k be a scalar. Prove that

(i) If A is symmetric, then kA is symmetric.

(ii) If A is skew-symmetric, then kA is skew-symmetric.

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9. Find the values of x, y, z if the matrix $A = [02yzxy - zx - yz]$ satisfy the equation $A^T A = I_3$.

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10. If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix} B = \begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix}, C = \begin{bmatrix} 2 & 0 \\ 1 & -2 \end{bmatrix}$ a=4 and b=-2, then show that

(i) A+(B+C)=(A+B)+C

(b) A(BC)=(AB)C

(iii) (a+b)B=aB+bB

(iv) a(C-A)=aC-aA

(v) $\left(A^T\right)^T = A$

(vi) $(bA)^T = bA^T$

(vii) $(AB)^T = B^T A^T$

(viii) $(A-B)C=AC-BC$

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

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Check Your Understanding True False

1. A matrix is an ordered rectangular array of numbers or functions.

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2. If A and B are symmetric matrices of the same order then (A) A-B is skew symmetric (B) A+B is symmetric (C) AB-BA is skew symmetric (D) AB+BA is symmetric

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Check Your Understanding Fill In The Blank

1. A diagonal matrix is said to be a _____ if its diagonal elements are equal (other than unity).

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Check Your Understanding

1. Construct a 2×2 matrix whose elements a_{ij} are given by $a_{ij} = i + j$.

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2. Compute $\begin{bmatrix} p & q \\ q & p \end{bmatrix} + \begin{bmatrix} p & q \\ -q & p \end{bmatrix}$.

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

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4. What is the order of the product matrix ?

$$\begin{bmatrix} a \\ b \\ c \end{bmatrix} [1 \quad 2 \quad 3] .$$

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5. Compute $\begin{bmatrix} a & 0 \\ a & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.

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6. Fins the transpose of $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

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7. If $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, the find $A + A'$

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Competition File Questions From Jee Main

1. The number of 3 3 non-singular matrices, with four entries as 1 and all other entries as 0, is

A. less that 4

B. 5

C. 6

D. at least 7.

Answer: D

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2. If $\omega = 1$ is the complex cube root of unity and matrix $H = \begin{vmatrix} \omega & 0 \\ 0 & \omega \end{vmatrix}$, then H^{70} is equal to:

A. O

B. $-H$

C. H^2

D. H

Answer: D

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3. Let $A = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{pmatrix}$. If u_1 and u_2 are column matrices such that $Au_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$ and $Au_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$, then $u_1 + u_2$ is equal to :

A. $\begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$

B. $\begin{bmatrix} -1 \\ 1 \\ -1 \end{bmatrix}$

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

D. $\begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$

Answer: D

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4. If A is an 3×3 non-singular matrix such that $AA^T = A^T A$ and $B = A^{-1}A^T$, then BB^T equals

A. I

B. B^{-1}

C. $\left(B^{-1}\right)'$

D. $I + B$.

Answer: A

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5. If $A = [12221 - 2a2b]$ is a matrix satisfying the equation $\forall^T = 9I$, where I is 3×3 identity matrix, then the ordered pair (a, b) is equal to :

(1) $(2, -1)$ (2) $(-2, 1)$ (3) (2, 1) (4) $(-2, -1)$

A. $(2, -1)$

B. $(-2, 1)$

C. $(2, 1)$

D. $(-2, -1)$.

Answer: D

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6. If $A = \begin{vmatrix} 5a & -b \\ 3 & 2 \end{vmatrix}$ and A adj $A = AA^T$, then 5a+b is equal to

A. 5

B. 4

C. 13

D. -1

Answer: A

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7. Let $P = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 9 & 3 & 1 \end{bmatrix} Q = [q_{ij}]$ and $Q = P^5 + I_3$ then $\frac{q_{21} + q_{31}}{q_{32}}$ is equal to (A) 12 (B) 8 (C) 10 (D) 20

A. 10

B. 125

C. 9

D. 15

Answer: A

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8. Let $\begin{bmatrix}1 & 2\\0 & 1\end{bmatrix}\begin{bmatrix}1 & 2\\0 & 1\end{bmatrix}.....\begin{bmatrix}1 & n-1\\0 & 1\end{bmatrix}=\begin{bmatrix}1 & 78\\0 & 1\end{bmatrix}$

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

A. $\begin{bmatrix}1 & 12\\0 & 1\end{bmatrix}$

B. $\begin{bmatrix}1 & -13\\0 & 1\end{bmatrix}$

C. $\begin{bmatrix}1 & -12\\0 & 1\end{bmatrix}$

D. $\begin{bmatrix}1 & 0\\-13 & 1\end{bmatrix}$.

Answer: B

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Chapter Test 3

1. If $A=\begin{bmatrix}\sin\alpha & -\sin\alpha\\\sin\alpha & \cos\alpha\end{bmatrix}$, then $A+A'=I$, if 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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2. If a matrix A is both symmetric and skew-symmetric, then A is a diagonal matrix (b) A is a zero matrix (c) A is a scalar matrix (d) A is a square matrix

A. A is a diagonal matrix

B. A is a zero matrix

C. A is a square matrix

D. None of these .

Answer: B

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3. The value of 'x', when the matrix : $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ is a skew - symmetric matrix is _____.

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4. Write the element a_{12} of the matrix $A = [a_{ij}]_{2X2}$; whose each ēlements are given by $a_{ij} = e^{2ix} \sin jx$.

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5. If the matrix $A = \begin{bmatrix} 3 & -3 \\ -3 & 3 \end{bmatrix}$ and $A^2 = \lambda A$, then write value of $'\lambda'$.

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6. If $2\begin{bmatrix} 3 & 4 \\ 5 & x \end{bmatrix} + \begin{bmatrix} 1 & y \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 10 & 5 \end{bmatrix}$, find $(x - y)$.

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7. if $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = 0$.

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8. Show that $A + A^T$ is symmetric when $A = \begin{bmatrix} 2 & 4 \\ 5 & 6 \end{bmatrix}$.

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9. By using elementary transformations, find the inverse of : $A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$

.

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10. If $\begin{bmatrix} x+3 & z+4 & 2y-7 \\ -6 & a-1 & 0 \\ b-3 & -21 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 6 & 3y-2 \\ -6 & -3 & 2c+2 \\ 2b+4 & -21 & 0 \end{bmatrix}$ Find the values of a, b, c,x,y and z

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

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12. Express the following matrix as the sum of a symmetric and skew symmetric matrix, and verify your result: $(3 \quad -2 \quad -43 \quad -2 \quad -5 \quad -112)$

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