MATHS

BOOKS - ARIHANT PUBLICATION

MATRICES

Solved Example

1. A shopkeeper sells 5 rings , 8 bracelets and 10 necklaces in first week and 11 rings 6 bracelets and 9 necklaces in next week .Show this information in a 2×3 matrix .

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2. In a matrix, $A = \begin{bmatrix} 2 & 5 & 19 & -7 \\ 35 & -2 & 5/2 & 12 \\ \sqrt{3} & 1 & -5 & 17 \end{bmatrix}$

(a) Write the order of the matrix.

(b) Write the elements a_{13}, a_{21}, a_{23} and a_{24}.

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3. In a matrix, $A = \begin{bmatrix} 2 & 5 & 19 & -7 \\ 35 & -2 & 5/2 & 12 \\ \sqrt{3} & 1 & -5 & 17 \end{bmatrix}$

(a) Write the order of the matrix.

(b) Write the elements a_{13}, a_{21}, a_{23} and a_{24}.

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4. If a matrix has 16 elements , then what are the possible orders it can have ?

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5. Construct a matrix of order 3×2 , whose elements are determined by $a_{ij} = \frac{2i - j}{3}$.

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6. Identify the following types of matrices :

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

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7. Identify the following types of matrices :

$$\begin{bmatrix} 1 & 4 & 5 \end{bmatrix}$$

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8. Identify the following types of matrices :

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

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9. Identify the following types of matrices :

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

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10. If $\begin{bmatrix} x-y & 2x+z \\ 2x-y & 3z+w \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$ then find x,y,z and w .

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11. Find the sum of two matrices A and B , If $A = \begin{bmatrix} 1 & \sqrt{2} \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -\sqrt{2} \\ 4 & 1 \end{bmatrix}$

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12. If A $\begin{bmatrix} 4 & 4 \\ 2 & 7 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 4 \\ 3 & -5 \end{bmatrix}$, then find A-B-C.

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13. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 1 \\ 4 & 0 \end{bmatrix}, B = \begin{bmatrix} 6 & 2 \\ 1 & 3 \\ 0 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} -8 & -4 \\ 2 & -4 \\ -4 & -4 \end{bmatrix}$, then

verify the commutative law with respect to addition I.e A+B=B+A.

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14. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 1 \\ 4 & 0 \end{bmatrix}, B = \begin{bmatrix} 6 & 2 \\ 1 & 3 \\ 0 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} -8 & -4 \\ 2 & -4 \\ -4 & -4 \end{bmatrix}$,

then

verify the associaltive law with respect to addition i.e

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

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15. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 1 \\ 4 & 0 \end{bmatrix}, B = \begin{bmatrix} 6 & 2 \\ 1 & 3 \\ 0 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} -8 & -4 \\ 2 & -4 \\ -4 & -4 \end{bmatrix}$,

then

find the additive inverse of matrix A.

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16. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ then find 2A +AB .

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17. Let A and B be two matrices such that $A = \begin{bmatrix} 2 & 1 \\ -1 & 0 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 0 & -1 \\ 3 & 2 \end{bmatrix}$ Verify the result $3(A + B) = 3A + 3B$

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

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19. Two farmers Ramkishan and Gurucharan Singh cultivates only three varieties of rice namely Basmati ,Permal and Naura .The sales (in Rs.) of thse varities of irce by both the farmers in the months of September and October are given by the following matrices A and B .

September sales (in Rs.)

$$A = \begin{matrix} \text{Basmati} & \text{Permal} & \text{Naura} \\ \end{matrix} \begin{bmatrix} 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{bmatrix} \begin{matrix} \text{Ramkishan} \\ \text{Gurucharan Singh} \end{matrix}$$

October sales (in ₹)

$$B = \begin{matrix} \text{Basmati} & \text{Permal} & \text{Naura} \\ \end{matrix} \begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix} \begin{matrix} \text{Ramkishan} \\ \text{Gurucharan Singh} \end{matrix}$$

If both farmers receive 2% profit on gross sales , then computer the profit for each variety sold in October .

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$$\begin{bmatrix} 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{bmatrix} \begin{matrix} \text{Ramkishan} \\ \text{Gurucharan Singh} \end{matrix}$$

October sales (in ₹)

$$B = \begin{matrix} & \text{Basmati} & \text{Permal} & \text{Naura} \\ \end{matrix}$$

$$\begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix} \begin{matrix} \text{Ramkishan} \\ \text{Gurucharan Singh} \end{matrix}$$

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21. Two farmers Ramkishan and Gurucharan Singh cultivates only three varieties of rice namely Basmati ,Permal and Naura .The sales (in Rs.) of thse varities of irce by both the farmers in the months of September and October are given by the following matrices A and B .

September sales (in Rs.)

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October sales (in ₹)

$$B = \begin{matrix} \text{Basmati} & \text{Permal} & \text{Naura} \\ \end{matrix} \begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix} \begin{matrix} \text{Ramkishan} \\ \text{Gurucharan Singh} \end{matrix}$$

If both farmers receive 2% profit on gross sales , then computer the profit for each variety sold in October .

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22. Find AB , if $A = \begin{bmatrix} 6 & 9 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 6 & 0 \\ 7 & 9 & 8 \end{bmatrix}$

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23. Compute the product of $\begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}$ and $\begin{bmatrix} 1 & -3 & 5 \\ 0 & 2 & 4 \\ 3 & 0 & 5 \end{bmatrix}$.

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24. Use matrix multiplication to divide Rs.30000 in two parts such that the total annual interest at 9% on the first part and 11% on the second part amounts Rs. 3060 .

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25. Three matrices A,Band C defined as $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}, B = \begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 0 \\ 1 & -2 \end{bmatrix}$, then show

that matrices A,B and C satisfy

(i) the property of associativity with respect to multiplication ,i.e A(BC)=(AB)C.

(ii) the property of distributivity with respect to addition i.e A(B+C)=AB+AC.

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26. 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 and BA. Show that A and B are not commutative, i.e. $AB \neq BA$.

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27. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then prove that $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}, n \in N.$

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28. Find the transpose of the matrix $\begin{bmatrix} 4 & 3 & 1 \\ 1 & -2 & 3 \\ 4 & 5 & -1 \end{bmatrix}$.

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29. 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

(A')'=A

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30. For the matrices A and B , verify that (AB) =B'A' , where $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$ and $B = [-1 \quad 2 \quad 1]$.

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31. Show that matrix $A = \begin{bmatrix} 3 & -4 & 2 \\ -4 & 0 & 6 \\ 2 & 6 & 1 \end{bmatrix}$ is a symmetric matrix.

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32. Show that all positive integral powers of a symmetric matrix are symmetric .

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33. Show that matrix $B = \begin{bmatrix} 0 & 3 & -4 \\ -3 & 0 & 2 \\ 4 & -2 & 0 \end{bmatrix}$ is skew- symmetric matrix.

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

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35. Prove that the squate matrix $\begin{bmatrix} 5 & 2 \\ 3 & -6 \end{bmatrix}$ can be expressed as a sum of symmetric and skew -symmetric matrices .

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36. If $(AB)^{-1} = A^{-1}B^{-1}$, then prove that A^{-1} and B^{-1} satisfy commutative property with respect to multiplication.

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37. Find the inverse of the matrix

$$A = \begin{bmatrix} 9 & 5 \\ 7 & 4 \end{bmatrix}$$

(i) by using row operations .

(ii) by using column operations .

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38. Find the inverse of the matrix $\begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$

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39. Obtain the inverse of the following matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

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Questions Fpr Practice Part I Matrix And Its Types Very Short Answer Type Questions

1. Write the order of the following matrices

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

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2. Write the order of the following matrices

$$[-1]$$

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3. In the matrix $A = \begin{bmatrix} a & 1 & x \\ 2 & \sqrt{3} & x^2 - y \\ 0 & 5 & -2/5 \end{bmatrix}$ Write

(i) the order of the matrix A.

(ii) the number of elements.

(iii) the value of elements a_{23}, a_{31} and a_{12}.

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4. In the matrix $A = \begin{bmatrix} a & 1 & x \\ 2 & \sqrt{3} & x^2 - y \\ 0 & 5 & -2/5 \end{bmatrix}$ Write

(i) the order of the matrix A.

(ii) the number of elements.

(iii) the value of elements a_{23}, a_{31} and a_{12}.

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5. In the matrix $A = \begin{bmatrix} a & 1 & x \\ 2 & \sqrt{3} & x^2 - y \\ 0 & 5 & -2/5 \end{bmatrix}$ Write

(i) the order of the matrix A.

(ii) the number of elements.

(iii) the value of elements a_{23}, a_{31} and a_{12}.

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

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7. Find the number of all possible matrices of order 3×3 with each of entry 0 or 1.

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8. Write the elements a_{23} of 3×3 matrix $A = [a_{ij}]$, whose elements a_{ij} are given by $a_{ij} = \frac{|i-j|}{2}$.

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9. Construct a matrix of order 2×2, whose elements are given by $a_{ij} = \frac{(i-2j)^2}{2}$

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10. $\begin{bmatrix} xy & 4 \\ z+6 & x+y \end{bmatrix} = \begin{bmatrix} 8 & w \\ 0 & 6 \end{bmatrix}$ then write the value of $(x+y+z)$.

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11. If $\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$ then write the value if a-2b .

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12. If $\begin{bmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{bmatrix} = \begin{bmatrix} 7 & 7y-13 \\ y & x+6 \end{bmatrix}$ then find the value of x+y.

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13. Find the values of x,y and z , if $\begin{bmatrix} x+y \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$.

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14. 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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15. 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 find (x-y) .

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16. If A=diag [2,-1,3[andB=diag [3,0,-1] , then find 4A+2B.

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

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18. If $2\begin{bmatrix}1 & 3\\ 0 & x\end{bmatrix}+\begin{bmatrix}y & 0\\ 1 & 2\end{bmatrix}=\begin{bmatrix}5 & 6\\ 1 & 8\end{bmatrix}$, then find the value of (x+y) .

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19. Find x,y,z and t, if $2\begin{bmatrix}x & z\\ y & t\end{bmatrix}+3\begin{bmatrix}1 & -1\\ 0 & 2\end{bmatrix}=3\begin{bmatrix}3 & 5\\ 4 & 6\end{bmatrix}$.

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20. 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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21. Write the matrix which when added to the matrix $\begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ give the matrix $\begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix}$

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Questions Fpr Practice Part I Matrix And Its Types Short Answer Type Questions

1. For what value of x and y are the following matrices equal ? A= $\begin{bmatrix} 2x+1 & 3y \\ 0 & y^2-5y \end{bmatrix}$ and $B = \begin{bmatrix} x+3 & y^2+2 \\ 0 & -6 \end{bmatrix}$

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2. If $\begin{bmatrix} x+y & z \\ 5 & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, then find the value of x and y .

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3. 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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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. Solve the matrix equation $\begin{bmatrix} x^2 \\ y^2 \end{bmatrix} - 3\begin{bmatrix} x \\ 2y \end{bmatrix} = \begin{bmatrix} -2 \\ -9 \end{bmatrix}$.

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6. If $X = \begin{bmatrix} 3 & 1 & -1 \\ 5 & -2 & -3 \end{bmatrix}$ and $Y = \begin{bmatrix} 2 & 1 & -1 \\ 7 & 2 & 4 \end{bmatrix}$, then find matrix Z, such that X+Y +Z is a zero matrix.

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7. 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 compute (A+B)and(B+C). Also verify that $A + (B - C) = (A + B) - C$.

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Questions Fpr Practice Part Imatrix And Its Types Short Answer Type Questions

1. If $A = \frac{1}{\pi}\begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}(x/\pi) \\ \sin^{-1}(x/\pi) & \cot^{-1}(\pi x) \end{bmatrix}$ and $B = \frac{1}{\pi}\begin{bmatrix} -\cos^{-1}(\pi x) & \tan^{-1}(x/\pi) \\ \sin^{-1}(\pi/x) & -\tan^{-1}(\pi x) \end{bmatrix}$ then find (A-B)

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Questions Fpr Practice Part Ii Multiplication Of Matrices Matrix Multiplecation Very Answer Type Questions

1. If $X_{m\times 3}Y_{p\times 4} = Z_{2\times b}$, for three matrices X,Y and Z, then find the values of m, p and b.

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2. If A and B are matrices of the same order and AB=BA, Then prove that $A^2 + 2AB + B^2 = (A+B)^2$

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3. If A and B are square matrices of the same order , then find (A+B)(A-B).

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

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

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6. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix} \text{and} B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ show that for no values of α, $A^2 = B$.

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7. If $[2x, 3]\begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}, \begin{bmatrix} x \\ 8 \end{bmatrix} = O$ then find the value of x .

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8. Find x, so that $\begin{bmatrix} 1 & x & 1 \end{bmatrix}\begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ x \end{bmatrix} = O$

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9. If $\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} A = \begin{bmatrix} 3 & 4 \end{bmatrix}$, then what is the order of the matrix A ?

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10. If $\begin{bmatrix} 3 & 2 \\ 7 & x \end{bmatrix} \begin{bmatrix} 5 & -2 \\ -7 & y \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then find the value of x and y.

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11. Write the matrix product AB, if $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$

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Questions Fpr Practice Part Ii Multiplication Of Matrices Matrix Multiplecation Short Answer Type Questions

1. If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ then show that $A^k = \begin{bmatrix} 1+2k & -4k \\ k & 1-2k \end{bmatrix}, k \varepsilon N$

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2. If A and B are square matrices of same order, then show by means of an example that $AB \neq BA$ in general.

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3. Find the product $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -2 & 3 \end{bmatrix}$

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

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

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6. Find x, so that $\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ x \end{bmatrix} = O$

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7. Find the matrix A such that $A\begin{bmatrix}1 & 2 & 3\\ 4 & 5 & 6\end{bmatrix} = \begin{bmatrix}-7 & -8 & -9\\ 2 & 4 & 6\end{bmatrix}$.

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8. If the matrix A is such that $\begin{bmatrix}1 & -1\\ 2 & 3\end{bmatrix}A = \begin{bmatrix}-4 & 1\\ 7 & 7\end{bmatrix}$ then find A.

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9. Let $A = \begin{bmatrix}2 & -1\\ 3 & 4\end{bmatrix}, B = \begin{bmatrix}5 & 2\\ 7 & 4\end{bmatrix}$ and $C = \begin{bmatrix}2 & 5\\ 3 & 8\end{bmatrix}$. Find a matrix D such that CD -AB =O .

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10. If $f(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then show that $f(x) \cdot f(y) = f(x+y)$.

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11. If A= $\begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, then find the values of a and b .

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12. If $A = \begin{bmatrix} 0 & -\tan\left(\frac{\alpha}{2}\right) \\ \tan\left(\frac{\alpha}{2}\right) & 0 \end{bmatrix}$ show that $(I+A) = (I-A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ where $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

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13. To promote the making of toilets for women , an organisation tried to generate awareness through

(i) house calls

(ii) letters and

(iii) announcements .The cost for each mode per attempt is given belo

(i) Rs. 50

(ii) Rs. 20

(iii) Rs. 40 The number of attempts made in three villages X, Y and Z are given below

	House calls	Letters	Announcements
X	400	300	100
Y	300	250	75
Z	500	400	150

Find the total cost incurred by the organisation for the three villages separately using matrices .

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14. There are threee families A , B and C . The number of men , women and children in these families are as under :

	Men	Women	Children
Family *A*	2	3	1
Family *B*	2	1	3
Family *C*	4	2	6

Daily expenses of men , women and children are Rs. 200 , Rs. 150 and Rs. 200 , repectively . Only men and women earn and children do not . Using matrix multiplication , calculate the daily expenses of each family .

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15. In a parliament election , a political party hired a public relations firm to promote its conditions in three ways telephone , house calls and letters .The cost per contact (in (paise) is given in matrix

$$B, \text{ as } B = \begin{bmatrix} 140 \\ 200 \\ 150 \end{bmatrix} \begin{matrix} \text{Telephone} \\ \text{House calls} \\ \text{Letters} \end{matrix}$$

The number of contacts of each type made in two cities X and Y is given in the matrix A, as

$$A = \begin{bmatrix} 1000 & 500 & 5000 \\ 3000 & 1000 & 10000 \end{bmatrix} \begin{matrix} \text{CityX} \\ \text{City Y} \end{matrix}$$

Find the total amount spent by the party in the two cities .

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16. There are two families A and B . There are 4 men , 6 women and 2 children in family A and 2 men ,

2 women and 4 children in family B.

The recommended daily amount of calories is 2400 for men , 1900 for women and 1800 for children , and 45 g of proteins for men , 55 g for women and 33 g for children .Represent the above information by matrices .Using matrices multiplication , calculate the total requirement of calories and proteins for each of the 2 families .

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Questions Fpr Practice Part Iii Transpose Of A Matrix Symmetric And Skew Symmetric Matrices Very Short Answer Type Questions

1. Find the transpose of matrix $\begin{bmatrix} -1 & 5 & 6 \\ \sqrt{3} & 5 & 6 \\ 2 & 3 & -1 \end{bmatrix}$.

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

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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 $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then find the value of A'A

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

.

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

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7. Write a 3×3 skew -symmetric matrix .

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8. Write a 2×2 matrix which is both symmetrc and skew -symmetric .

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9. Show that A'A and AA ' are both symmetric matrices for any matrix A.

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10. If A is symmetric , then show that B' AB is symmetric matrix .

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11. If A and B are symmetric matrices , then prove that AB+ BA is a symmetric matrix .

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12. If A and B are symmetric matrices of the same order , then prove that following matrices are skew symmetric matrix :

(i) AB' -BA'

(ii) AB- BA

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

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14. If A is a skew -symmetric matrix , then show that A^2 is a symmetric matrix .

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Questions Fpr Practice Part Iii Transpose Of A Matrix Symmetric And Skew Symmetric Matrices Short Answer Type Questions

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

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4. If $A = \begin{bmatrix} 2 & 4 & 0 \\ 3 & 9 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 8 \\ 1 & 3 \end{bmatrix}$ then verify that (AB)'=B'A'.

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5. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ is a matrix satisfying AA '=9I, then find the values of x and y.

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

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

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

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Questions Fpr Practice Part Iv Inverse Of A Matrix By Elementary Operations Very Short Answer Type Questions

1. Use the elementary row operation $R_1 \to R_1 - 3R_2$ in the matrix equation $\begin{bmatrix} 4 & 2 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix} \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$

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2. Use the elementary row operation $R_1 \to R_1 - 3R_2$ in the matrix equation $\begin{bmatrix} 4 & 2 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix} \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$

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3. Using elementary column transformation , find the inverse of the matrix $\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$

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4. Using elementary column transformation find the inverse of the matrix $\begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$

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5. Using elementary row transformation , find the inverse of the matrix $A = \begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix}$.If $A^{-1} = \frac{1}{2}\begin{bmatrix} 2 & a \\ b & 3 \end{bmatrix}$, then find the values of a and b .

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6. Find the inverse of the matrix :

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

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7. Find the inverse of the matrix $\begin{bmatrix} 4 & -2 \\ 3 & 1 \end{bmatrix}$

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8. Find the inverse of the matrix $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

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9. Using elementary transformation , find the inverse of the following matrices .

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

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10. Using elementary transformation , find the inverse of the following matrices .

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

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11. Using elementary transformation , find the inverse of the following matrices .

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

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12. Using elementary transformation , find the inverse of the following matrices .

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

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13. Using elementary transformation , find the inverse of the following matrices .

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

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14. Using elementary transformation , find the inverse of the following matrices .

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

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15. Using elementary transformation , find the inverse of the following matrices .

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

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16. Using elementary transformation, find the inverse of the following matrix, if it exists. $\begin{bmatrix} 2 & 3 & -3 \\ -1 & -2 & 2 \\ 1 & 1 & -1 \end{bmatrix}$

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Questions Fpr Practice Part Iv Inverse Of A Matrix By Elementary Operations Short Answer Type Questions

1. Find P^{-1}, if exists and given $P = \begin{bmatrix} 10 & -2 \\ -5 & 1 \end{bmatrix}$

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Odisha Bureau S Textbook Solutions Exercise A

1. State the order of the following matrices .

$[a \quad b \quad c]$

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2. State the order of the following matrices .

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

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3. State the order of the following matrices .

$$\begin{bmatrix} x & y \\ y & z \\ z & x \end{bmatrix}$$

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4. State the order of the following matrices .

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

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5. How many entries are there in a

(i) 3×3 matrix ?

(ii)A square matrix of order p ?

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6. How many entries are there in a

3×4 matrix

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7. How many entries are there in a $p \times q$ matrix

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8. How many entries are there in a sqare matrix of order p?

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9. Give an example of 3×1matrix

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10. Give an example of 2×2matrix

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11. Give an example of 4×2matrix

Watch Video Solution

12. Give an example of 1×3matrix

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13. Let $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 1 \\ 4 & 5 & 6 & 1 & 2 \\ 3 & 9 & 1 & 1 & 6 \end{bmatrix}$ What is the order of A?

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14. Let $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 1 \\ 4 & 5 & 6 & 1 & 2 \\ 3 & 9 & 1 & 1 & 6 \end{bmatrix}$ Write down the entries a_{31}, a_{25}, a_{23} ?

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15. Let $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 1 \\ 4 & 5 & 6 & 1 & 2 \\ 3 & 9 & 1 & 1 & 6 \end{bmatrix}$ Write down A^T.

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16. Let $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 1 \\ 4 & 5 & 6 & 1 & 2 \\ 3 & 9 & 1 & 1 & 6 \end{bmatrix}$ What is the order of A^t?

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17. Matrices A and B are given below .Find A+B,B+A,A-BandB -A

Verify that

A+B=B+A and B-A=-(A-B).

$A = \begin{bmatrix} 7 \\ 1 \end{bmatrix} B = \begin{bmatrix} -6 \\ 9 \end{bmatrix}$

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18. Matrices A and B are given below .Find A+B,B+A,A-BandB -A

Verify that

A+B=B+A and B-A=-(A-B).

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

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19. Matrices A and B are given below .Find A+B,B+A,A-BandB -A

Verify that

A+B=B+A and B-A=-(A-B).

$$A = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{3} & \frac{1}{5} \end{bmatrix} B = \begin{bmatrix} \frac{1}{3} & \frac{1}{2} \\ \frac{1}{2} & \frac{4}{5} \end{bmatrix}$$

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20. Matrices A and B are given below .Find A+B,B+A,A-BandB -A

Verify that

A+B=B+A and B-A=-(A-B).

$$A = \begin{bmatrix} 1 & a-b \\ a+b & -3 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & b \\ -a & 5 \end{bmatrix}$$

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21. Matrices A and B are given below .Find A+B,B+A,A-BandB -A

Verify that

A+B=B+A and B-A=-(A-B).

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

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22. Find the 2×2 matrix X, if $X + \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$

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23. Find the $2 \times 2 mtrix$X Given [x y z]-[-4 3 1] =[-5 1 0]`

derermine x,y,z.

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24. If $\begin{bmatrix} x_1 & x_2 \\ y_1 & y_2 \end{bmatrix} - \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$ determine x_1, x_2, y_1, y_2.

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25. Find the 2×2 mtrix X find a matrix which when added to $\begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ gives $\begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix}$

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26. Caculate whenever possible , the following products .

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

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27. Caculate whenever possible , the following products .

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

Watch Video Solution

28. Caculate whenever possible , the following products .

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

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29. Find the product $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}\begin{bmatrix} 1 & -2 \\ -2 & 3 \end{bmatrix}$

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30. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ Calculate

AB

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31. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ Calculate

BA

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32. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ Calculate

BC

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33. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ Calculate

CB

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34. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ Calculate

AC

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35. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ Calculate CA

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36. Find the following products .

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

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37. Find the following products .

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

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38. Find the following products .

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

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39. Find the following products .

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

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40. Find products : $\begin{bmatrix} 1 & i \\ i & -1 \end{bmatrix}^2$ where $I = \sqrt{-1}$

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41. Find the following products .

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

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42. Find the following products .

$$\begin{bmatrix} 0 & k \\ 1 & 0 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

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43. Find the following products .

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

Watch Video Solution

44. Find the following products .

$$\begin{bmatrix} 1 & 0 \\ 0 & k \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

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45. Find the following products .

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

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46. Write true or false in the following case:

The sum of a 3×4 matrix with a 3×4 matrix is a 3×3 matrix.

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47. state true or false $k[0] = 0, k \in R$

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48. Write true or false in the following case:

A-B = B -A if one of A and B is zero and A and B are of the same order.

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49. Write true or false in the following case:

$A + B = B + A$, if A and B are matrices of the same order.

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50. Write true or false. $\begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} + \begin{bmatrix} -1 & 0 \\ 2 & 0 \end{bmatrix} = 0$

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51. Write true or false. $\begin{bmatrix} 3 & 1 \\ 6 & 2 \end{bmatrix} = 3\begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$

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52. Write true or false in the following case:

With five elements a matrix can not be constructed.

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53. Write true or false in the following case:

The unit matrix is its own transpose.

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54. If $A = \begin{bmatrix} 2 & 4 \\ 3 & 13 \end{bmatrix}$ and $\mathrm{I} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ find $A - \alpha I, \alpha \in R.$

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55. Find x and y :

$$\begin{bmatrix} x & -2y \\ 0 & -2 \end{bmatrix} = \begin{bmatrix} 1 & -8 \\ 0 & -2 \end{bmatrix}$$

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56. Find x and y in the following

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

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57. Find x and y in the following

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

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58. Find x and y in the following

$$\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

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59. Find x and y in the following

$$[2x \quad -y] + [y \quad 3x] = 5[1 \quad 0]$$

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60. The element of ith row and jth column of the following matrix is $I + j$. Complete the matrix.

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

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61. Write down the matrix

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix} \text{if} a_{ij} = 2i + 3j$$

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62. Construct a 2×3 matrix having elements given by

$a_{ij} = i + j$

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63. Construct a 2×3 matrix having elements given by

$a_{ij} = i - j$

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64. Construct a 2×3 matrix having elements given by

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

(ii) $a_{ij} = i \times j$

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65. Construct a 2×3 matrix having elements given by

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

(ii) $a_{ij} = i \times j$

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66. If $\begin{bmatrix} 2x & y \\ 1 & 3 \end{bmatrix} + \begin{bmatrix} 4 & 2 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 8 & 3 \\ 1 & 2 \end{bmatrix}$, find x and y .

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67. Find A such that $\begin{bmatrix} 2 & 3 & 4 \\ 1 & 0 & -2 \\ 3 & 1 & -1 \end{bmatrix} + A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & -1 & 0 \\ 1 & 3 & 2 \end{bmatrix}$

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68. If $\begin{bmatrix} x+y & x-z \\ 2x-y & 0 \end{bmatrix} = \begin{bmatrix} 2 & 2 \\ 1 & 0 \end{bmatrix}$,find the value of x,y,z.

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69. What is the order of the matrix B if $[\ 3\ \ 4\ \ 2\ ]\,\mathrm{B} = [\ 2\quad 1\ \ 0\ \ 3\ \ 6]$

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70. Find A if $\begin{bmatrix} 4 \\ 1 \\ 3 \end{bmatrix} A = \begin{bmatrix} -4 & 8 & 4 \\ -1 & 2 & 1 \\ -3 & 6 & 3 \end{bmatrix}$

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71. Find B if $B^2 = \begin{bmatrix} 17 & 8 \\ 8 & 17 \end{bmatrix}$

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72. Find x and y when $\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \end{bmatrix}.$

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73. Find AB and BA given that:

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

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74. Find AB and BA given that:

$$A = \begin{bmatrix} 7 & 5 \\ 6 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

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75. Find AB and BA given that:

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

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76. Find AB and BA given that:

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

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77. Evaluate $[[2, 1] + 2[0, -2]] \begin{bmatrix} 2 & 1 & 3 \\ 1 & -2 & 0 \end{bmatrix}$

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78. Evaluate $\left[\begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix} + \begin{bmatrix} 1 & -2 \\ 2 & 3 \end{bmatrix}\right] \begin{bmatrix} 2 \\ 1 \end{bmatrix}$

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

Show that AB=AC

though $B \neq C$.Verify that: A+(B+C)=(A+B)+C

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80. Find A and B where

2A+B= $\begin{bmatrix} 2 & 2 & 5 \\ 5 & 4 & 3 \\ 1 & 1 & 4 \end{bmatrix} \text{and} A - 2B = \begin{bmatrix} 1 & 6 & 5 \\ 5 & 2 & -1 \\ -2 & -2 & 2 \end{bmatrix}$

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81. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ and I is the 2×2 unit matrix, find $(A - 2I)(A - 3I)$

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82. Verify that $[AB]^T = B^T A^T$ where $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ -1 & 1 \end{bmatrix}$

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83. Verify that $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ satisfies the equation $A^2 - (a+d)A + (ad-bc)I = 0$ where I is the 2x2 unit matrix.

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84. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, show that $A^3 - 23A - 40I = 0$

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85. Simplify:

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

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86. If A and B are matrices of the same order and AB=BA, Then prove that $A^2 - B^2 = (A - B)(A + B)$

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87. If A and B are matrices of the same order and AB=BA, Then prove that $A^2 - 2AB + B^2 = (A - B)^2$

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88. If A and B are matrices of the same order and AB=BA, Then prove that $A^2 - 2AB + B^2 = (A - B)^2$

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89. If α and β are scalars and A is a square matrix then prove that

$(A - \alpha I).(A - \beta I) = A^2 - (\alpha + \beta)A + \alpha\beta I$ where I is a unit matrix of same order as A.

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90. If αandβ, are scalars such that $A = \alpha B + \beta I$, where A,B and the unit matrix I are of the same order, then prove that

AB=BA.

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91. If $A = \begin{bmatrix} -1 & 3 & 5 \\ 1 & -3 & -5 \\ -1 & 3 & 5 \end{bmatrix}$ Show that $A^2 = A$.

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92. If $A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$

and $B = \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$

find $2A + 3B, 2A - 3B.$

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93.

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

, find

$A - 3B + 2C$

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94.

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

, find

$(A + B - C)^T$

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95.

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

, find

$B^T - C^T$

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

verify

(i) $(A + B)C = AC + BC$

(ii) $(AB)C = A(BC)$

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97. $\begin{bmatrix} 1 & -2 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} x & 2 \\ 1 & y \end{bmatrix} = \begin{bmatrix} -3 & 4 \\ -1 & 4 \end{bmatrix}$, find x and y .

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

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99. If A,B,C are matrices of order 2×2 each and

$2A + B + C = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$

$A + B + C = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$

$A + B - C = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$ find A,B and C.

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100. If $\begin{bmatrix} x & y \\ x & \frac{x}{2}+t \end{bmatrix} + \begin{bmatrix} y & x+t \\ x+2 & \frac{x}{2} \end{bmatrix} = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$

find x,y,z and t.

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101. There are two families A and B . There are 4 men , 6 women and 2 children in family A and 2 men ,

2 women and 4 children in family B.

The recommended daily amount of calories is 2400 for men , 1900 for women and 1800 for children , and 45 g of proteins for men , 55 g for women and 33 g for children .Represent the above information by matrices .Using matrices multiplication , calculate the total requirement of calories and proteins for each of the 2 families .

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102. A trust fund has Rs. 50,000 that is to be invested in two types of bonds .The first and second bonds respectively pay annual interest at the rate of 5% and 6% respectively .Using matrix multiplication , determine how to invest the money in these bonds so as to get a total annual interest of Rs. 2780 .

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Odisha Bureau S Textbook Solutions Exercise B

1. State which of the following matrices is symmetric,slew symmetric, both or not either:

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

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2. State which of the following matrices are symmetric , skew symmetric , both or not either .

$$\begin{bmatrix} x & 1 & 2 \\ -1 & y & 3 \\ -2 & -3 & z \end{bmatrix}, (x, y, z) \neq (0, 0, 0)$$

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3. State which of the following matrices are symmetric , skew symmetric , both or not either .

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

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4. State which of the following matrices are symmetric , skew symmetric , both or not either .

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

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5. State which of the following matrices are symmetric , skew symmetric , both or not either .

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

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6. State which of the following matrices are symmetric , skew symmetric , both or not either .

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

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7. State which of the following matrices are symmetric , skew symmetric , both or not either .

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

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8. State True or False

If A and B are symmetric matrices of the same order and AB-BA $\neq$ 0 , then AB is not symmetric .

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9. State'True'or'false':For any square matrix A, AA' is symmetric.

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10. State'True'or'false':If A is any skew symmetric matrix, then A^2 is also skew symmetric.

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11. State'True'or'false': If A is symmetric, then $A^2, A^3, \ldots\ldots, A^n$ are all symmetric.

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12. State'True'or'false':If A is symmetric then $A - A^1$ is both symmetric and skew symmetric.

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13. State'True'or'false':For any square matrix $\left(A - A^1\right)^2$ is skew symmetric.

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14. State'True'or'false': A matrix which is not symmetric is skew symmetric.

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15. If A and B are symmetric matrices of the same order with $AB \neq BA$, final whether AB-BA is symmetric or skew symmetric.

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16. If a symmetric /skew symmetric matrix is expressed as a sum of a symmetric and a skew symmetric matrix then prove that one of the matrices in the sum must be zero matrix .

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17. A and B are square matrices of the same order, prove that : if A,B and AB are all symmetric, then AB-BA =0

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18. A and B are square matrices of the same order, prove that :If A,B and AB are all skew symmetric then AB+BA=0

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19. If $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 3 \\ -2 & 5 & 3 \end{bmatrix}$, then verify that

A+A ' is symmetric

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20. If $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 3 \\ -2 & 5 & 3 \end{bmatrix}$ then verify that A+A is symmetric and

A-A is skew-symmetric.

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21. Prove that a unit matrix is its own inverse Is the converse true ?

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22. If $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 3 \\ 3 & -3 & 4 \end{bmatrix}$ show that $A^2 = I$ and hence $A = A^{-1}$. (Here A us an inovoluntary matrix recall the definition given earlier)

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23. Show that $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ is its own inverse.

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24. Express as a sum of a symmetric and a skew symmetric matrix:

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

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25. Express as a sum of a symmetric and skew symmetric matrix.

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

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26. Express as a sum of a symmetric and skew symmetric matrix.

$$\begin{bmatrix} x & a & b \\ a & y & c \\ b & c & z \end{bmatrix}$$

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27. Express as a sum of a symmetric and a skew -symmetric matrix .

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

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28. Express as a sum of a symmetric and a skew symmetric matrix:

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

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29. Express as a sum of a symmetric and a skew symmetric matrix:

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

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30. Express as a sum of a symmetric and a skew symmetric matrix:

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

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31. What is the inverse of :

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

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32. What is the inverse of

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

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33. Find inverse of the following matrices by elementary row/column operation (transformations):

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

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34. Find inverse of the following matrices by elementary row/column operation (transformations):

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

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35. Find inverse of the following matrices by elementary row/column operation (transformations):

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

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36. Find inverse of the following matrices by elementary row/column operation (transformations):

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

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37. Find inverse of the following matrices by elementary row/column operation (transformations):

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

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38. Find the inverse of the following matrices by elementary row /column operation (trasformations)

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

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39. Find the inverse of the following matrices using elementary transformation

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

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40. Find the inverse of the following matrices using elementary transformation

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

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41. Find the inverse of the following matrices using elementary transformation

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

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42. Find the inverse of the following matrices using elementary transformation:

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

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43. Find the inverse of the following matrices using elementary transformation

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

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Chapter Practice Very Short Answer Type Questions

1. What possible orders of a matrix can have , if it has

(i) 5 elements ?

(ii) 8 elements ?

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

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3. Find the number of all possible matrices of order 3×3 with each of entry 0 or 1.

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4. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then for what value of α, A is an identity matrix?

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5. If $\begin{bmatrix} x+3 & z+4 & 2y-7 \\ -6 & a-1 & 0 \\ b-3 & -21 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 6 & 3y-2 \\ -6 & -3 & 2c+2 \\ 2b+4 & -21 & 0 \end{bmatrix}$

then find the values of a,b,c,and z .

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6. If Possible , then find the sum of the matrices A and B , where

$A = \begin{bmatrix} \sqrt{3} & 1 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} x & y & z \\ a & b & c \end{bmatrix}$.

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7. Simplify $\begin{bmatrix} \cos^2 x & \sin^2 x \\ \sin^2 x & \cos^2 x \end{bmatrix} + \begin{bmatrix} \sin^2 x & \cos^2 x \\ \cos^2 x & \sin^2 x \end{bmatrix}$

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8. Find the value of y and x from the following equation

$$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$$

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9. Find 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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10. Solve for x and y , x $\begin{bmatrix} 2 \\ 1 \end{bmatrix} + y\begin{bmatrix} 3 \\ 5 \end{bmatrix} = \begin{bmatrix} -8 \\ -11 \end{bmatrix}$

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

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

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13. Assume Y, W and P are the matrices of orders $3 \times k, n \times 3$ and $p \times k$ .Find the restrictions on n,k and p, so that PY + WY will be defined .

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14. Let $A = [a_{ij}]_{n \times n}$ be a diagonal matrix whose diagonal elements are different and $B = [b_{ij}]_{n \times n}$ is some another matrix if $AB = [c_{ij}]_{n \times n}$, then find c_{ij}.

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15. Suppose $A = \begin{bmatrix} 5 & 4 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 & 1 \\ 6 & 8 & 4 \end{bmatrix}$, then find AB and BA if they exist .

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16. Find x from the matrix equation $\begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} x \\ 2 \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$.

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17. If matrix $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = kA$, then write the value of k .

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18. Show by an example that for $A \neq O, B \neq O$ and $AB = O$.

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

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20. If $A = \begin{bmatrix} 0 & -1 & 2 \\ 4 & 3 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 \\ 1 & 3 \\ 2 & 6 \end{bmatrix}$ then verify that :

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

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

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21. If A is a 4×5 matrix and B is a matrix such that $A^T B$ and BA^T both are defined, then write the order of B.

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22. If A and B are symmetric matrices , then prove that BA - 2AB is neither a symmetric matrix nor skew - symmetric matrix .

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

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24. If possible then find the value of BA and AB , where $A = \begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$ and $B \begin{bmatrix} 4 & 1 \\ 2 & 3 \\ 1 & 2 \end{bmatrix}$.

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25. $A = \begin{bmatrix} 3 & -4 \\ 1 & 1 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$, then verify that $(BA)^2 \neq B^2A^2$.

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26. If $A = \begin{bmatrix} & \\ & \end{bmatrix}$ and $B = \begin{bmatrix} & \\ & \end{bmatrix}$, then find the matrices $A^2, B^2, A+B, A-B$ and $A^2 - B^2$.

Is $A^2 - B^2 = (A+B)(A-B)$?

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27. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, then show that $(A+B)(A-B) \neq A^2 - B^2$.

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28. If $A = [2 \quad 1], B = \begin{bmatrix} 5 & 3 & 4 \\ 8 & 7 & 6 \end{bmatrix}$ and $C = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 0 & 2 \end{bmatrix}$ then verify that $A(B+C) = AB + AC$.

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29. If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$ then prove that (A+B)C=AC+BC.

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30. How many different matrix products can you form with these three matrices ?

$A = [5 \quad 2], B = \begin{bmatrix} 3 \\ 4 \\ 1 \end{bmatrix}$ and $C = \begin{bmatrix} -1 & 3 & -1 \\ 2 & 1 & 4 \end{bmatrix}$, then find these products .

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31. Solve the matrix $\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = O.$

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32. If $A_\alpha = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then prove that $A_\alpha A_\beta = A_{\alpha+\beta}.$

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33. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then find the value of A'A

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34. If $\begin{bmatrix} 2 & 1 & 3 \end{bmatrix} \begin{bmatrix} -1 & 0 & -1 \\ -1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} = A$, then find the value of A .

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35. Find the matrix A satisfying the equation

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

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36. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, then prove that A is a root of the polynomial $f(x) = x^3 - 6x^2 + 7x + 2.$

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37. Let $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ and $f(x) = x^2 - 4x + 7$. Show that f(A)=O. Use this result to find A^5 .

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38. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, then find $A^2 - 5A + 6I$.

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39. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, then prove that $A^3 - 4A^2 + A = O$.

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40. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$, thenfind k such that $A^2 - 8A + kI = O$.

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41. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, then find k such that $A^2 = kA - 2I$.

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42. For the matrix $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$, find a and b such that $A^2 + aI = bA$, where I is a 2×2 identity matrix.

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43. Given that, $A = \begin{bmatrix} 4 & 0 \\ 2k & 5k \end{bmatrix}$ and $B = \begin{bmatrix} k & 0 \\ 3 & -1 \end{bmatrix}$ such that AB=BA. From an equation in k and show that it reduces to $2k^2 + 17k - 12 = 0$

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44. A factory makes three products P,Q and R .The table shows the units of labour , materials and other items needed to produce one of each product .

Product	Labour	Materials	Other items
P	4	3	$2+a$
Q	5	$2+b$	3
R	2	5	4

Represent this data by a matrix A, Given that labour costs Rs.10 per unit , materials Rs. 4 per unit and other items B. Given that , the total cost of the product P is Rs. 82 and the product Q is Rs. 88 , respectively .Find the values of a and b .

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45. A manufacturer sells the products x,y and z in two markets .Annual sales are indicated below :

Market	Products		
I	10000	2000	18000
II	6000	20000	8000

(i) If unit sale prices of x,y and x are Rs. 2.50 , Rs. 1.50 and Rs.1.00 respectively , then find the total revenue in each market with the help of matrix algebra .

(ii) If the unit costs of the above three commodities are Rs. 2.00 ,Rs 1.00 and 50 paise , respective,y .Find the gross profit .

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46. A trust fund has Rs. 35000 is to be invested in two different types of bonds .The first bond pays 8% interest per annum which will be given to orphanage and second bond pays 10%

interest per annum which will be given to an NGO (Cancer Aid Society) Using matrix multiplication , determine how to divide Rs. 35000 among two types of bonds , if the trust fund obtains an annual total interest of Rs. 3200 .

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47. If AB= BA for any two square matrices , then prove by mathematical induction that $(AB)^n = A^n B^n$.

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48. If A = diag $[a \quad b \quad c]$, then show that

$A^n = \text{diag}[\, a^n \quad b^n \quad c^n \,], \forall n \in N.$

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49. 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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50. $FIND \frac{1}{2}(A + A')$ and $\frac{1}{2}(A - A')$, where $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$

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51. Two shopkeepers A and B of a particular school have stock of books on moral education non - violence and truth as given by

	Shop A	Shop B
Moral education	24	12
Non-violence	48	24
Truth	36	60

If the selling prices of these books are respectively Rs. 400 ,Rs. 350 and Rs. 300 per book .Find the total amount received by each shopkeeper , if all the books are sold , using matrices .

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52. Three schools A ,B and C want to award their selected students for the values of Honesty , Regularity and Hard work .Each school decied to award a sum Rs. 2500 . Rs. 3100 ,Rs. 5100 per students for the respective values .the number of students to be awarded by three schools is given below in the table

Values	A	B	C
Honesty	3	4	6
Regularity	4	5	2
Hard work	6	3	4

Find the total money given in awards by the three schools separately , using matrices .

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53. If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, then show that (A-A') is a skew - symmetric matrix , where A' is the transpose of matrix A.

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

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55. Using elementary row transformation , find inverse of matrix $A = \begin{bmatrix} 6 & 5 \\ 5 & 4 \end{bmatrix}$.

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56. Find the inverse of matrix $A = \begin{bmatrix} 1 & 2 & 4 \\ -1 & -2 & -1 \\ 2 & 1 & -1 \end{bmatrix}$ by elementary transformation method and verify that $\forall^{-1} = I$.

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