



MATHS

BOOKS - ARIHANT PRAKASHAN

MATRICES

Topic 01 Practice Questions 1 Mark Questions

1. If A is a 4 imes 5 matrix and B is a matrix such that A^TB

and BA^T both are defined, then write the order of B.

2. Find the 2 imes 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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3. If
$$[1 \ 2 \ 3]A = [0]$$
, then what is the order of the matrix A ?

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4. 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 .

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

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

(a) Write the order of the matrix.

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

7. What is A+B, if
$$A=egin{bmatrix} 1&2\3&-1 \end{bmatrix}$$
 and $B=egin{bmatrix} 0&-1\-2&1 \end{bmatrix}$



8. Find the value of
$$egin{pmatrix} 1 & i \ i & -1 \end{bmatrix}$$
 where $i=\sqrt{-1}$

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

matrix.



11. 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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Topic 01 Practice Questions 4 Mark Questions

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

then show that

$$A^3 - 23A - 40I = O$$

2. 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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3. If A,B,C are matrices of order
$$2 \times 2$$
 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.

4. 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.



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

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

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



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

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11. 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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12. If
$$A=egin{bmatrix}2&0&1\\2&1&3\\1&-1&0\end{bmatrix}$$
 then find the value of $A^2-3A+2I$

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



15. 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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Topic 01 Practice Questions 6 Mark Questions

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

2.

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

find

(i)
$$\left(A+B-C
ight)^T$$

(ii)
$$B^T - C^T$$

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Topic 01 Topic Test 1

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

(i) the order of the matrix A.

If

(ii) the number of elements.

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

2. 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.

3. If matrix
$$A=egin{bmatrix} a_{ij} \end{bmatrix}_{2 imes 2}$$
 where $a_{ij}=egin{bmatrix} 2 & i
eq j \ 0 & i=j \end{bmatrix}$ then

write the matrix A.



4. Construct a 3 imes 2 matrix, whose elements are given by

$$a_{ij} = e^{ix} \sin jx.$$

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

6. If
$$A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$$
 and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$ then find AB and BA. Show that A and B are not commutative, i.e. $AB \neq BA$.



7. If
$$M(\theta) = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$$
 then show that $M(x)M(y) = M(x+y).$

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8. If A is a square matrix such that $A^2 = I$, then find the

simplified value of
$$\left(A-I
ight)^3+\left(A+I
ight)^3-7A$$

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9. If
$$A = egin{bmatrix} 1 & 2 \ 2 & 1 \end{bmatrix}$$
 then show that $A^2 - 3I = 2A.$

10. Find the value of k, if
$$M = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$$
 and

$$M^2 - kM - I_2 = O$$

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11. Express the matrix
$$A=egin{bmatrix}2&4&-6\\7&3&5\\1&-2&4\end{bmatrix}$$
 as the sum of

a symmetric and a skew- symmetric matrices.

12. 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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13. If A and B are matrices of the same order and AB=BA

then prove that

(i)
$$A^2 - B^2 = (A - B)(A + B)$$

(ii)
$$A^2 + 2AB + B^2 = (A+B)^2$$

(iii) $A^2 - 2AB + B^2 = (A - B)^2$

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Topic 02 Practice Questions 1 Mark Questions





Topic 02 Practice Questions 6 Mark Questions





2. By elementary operations, find A^{-1} for the following:

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

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

4. Find the inverse of the matrix

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

(i) by using row operations .

(ii) by using column operations .



5. 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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Topic 02 Topic Test 2

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

2. Use the elementary row operation $R_1 \rightarrow R_1 - 3R_2$ 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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4. If
$$A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -1 \\ -1 & -2 & 2 \end{bmatrix}$$
 show that A^{-1} does not

exist.



7. If A and B are invertible matrices of the same order, then prove that $(AB)^{-1} = B^{-1}A^{-1}$



Chapter Test 1 Mark Questions



2. Find the 2 imes 2mtrixX Given [x y z]-[-4 3 1] =[-5 1 0]`

derermine x,y,z.

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3. How many entries are there in a

(i) 3 imes 3 matrix ?

(ii)A square matrix of order p?





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5. If the matrix
$$A = egin{bmatrix} 2 & -2 \ -2 & 2 \end{bmatrix}$$
 and $A^2 = PA$, then

write the value of P.

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Chapter Test 4 Mark Questions

1. Construct a 2 imes 3 matrix having elements given by

(i)
$$a_{ij} = rac{\imath}{j}$$

(ii) $a_{ij} = i imes j$

2. 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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3. Verify that
$$A = egin{bmatrix} a & b \ c & d \end{bmatrix}$$

satisfies the equation $A^2 - (a+d)A + (ad-bc)I = 0$

where I is the 2x2 unit matrix.

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4. 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'.





5. 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.



6. Find inverse of the following matrices by elementary

row/column operation (transformations):

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

7. Using elementary column transformation find the

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



Chapter Test 6 Mark Questions

1. 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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2. 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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3. Express as a sum of a symmetric and a skew symmetric

matrix:

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





4. Find the inverse of the following matrices using

elementary transformation

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