



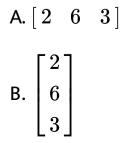
# MATHS

# **BOOKS - BETTER CHOICE PUBLICATION**

# MATRICES

Solve Examples Section I M C Q

1. If 
$$A = egin{bmatrix} 1 & 2 & 3 \end{bmatrix}, B = egin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$$
, then AB equals



C. [12]

D. none of these

#### Answer: D

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

A. identity matrix

B. Diagonal matrix

C. Symmetric matrix

D. Skew symmetric matrix

#### Answer: D



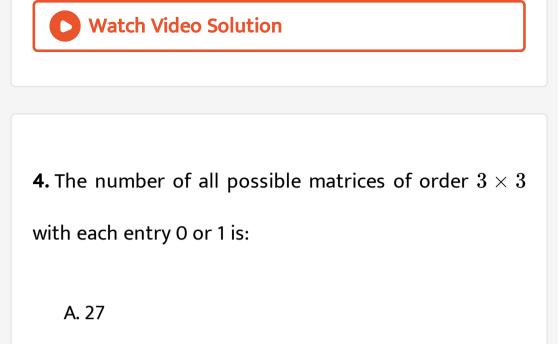
]

**3.** If A = 
$$(2 \ 1 \ 3)$$
, then  $AA^T$  is equal to

A. 
$$\begin{bmatrix} 4 & 1 & 9 \\ B. \begin{bmatrix} 4 \\ 1 \\ 9 \end{bmatrix}$$
  
C. [14]

D. [6]

Answer: C



B. 18

C. 81

D. 512

Answer: D



5. If A is a matrix of order 3 imes 4, then each column of

matrix A contains elements :

A. 12

B. 4

C. 3

D. none of these

Answer: C



**6.** If AB = C, where B and C are matrices of order 3 imes 5,

then order of A is :

A.  $3 \times 3$ B.  $3 \times 3$ C.  $5 \times 5$ 

D. 5 imes 3

#### Answer: A



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

A. 
$$m > n$$

$$\mathsf{B}.\,m=n$$

 $\mathsf{C}.\,m < n$ 

D. none of these

#### Answer: D



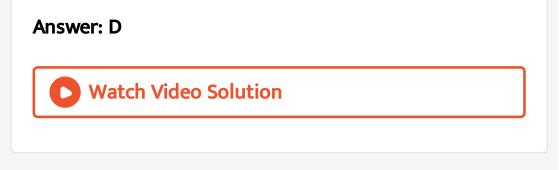
#### 8. For any two matrices A and B we have

A. AB = BA

 $\mathsf{B.}\,AB\neq BA$ 

C. AB = 0

D. none of these



Solve Examples Section Ii Short Answer Type Questions

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

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2. Construct a2 imes 2 matrix  $A=ig[a_{ij}ig]$  whose elements are given by  $a_{ij}=rac{i}{j}$ 





**3.** Construct a  $3 \times 2$  matrix whose elements are given

by 
$$a_i j = rac{1}{2} |i-3j|$$

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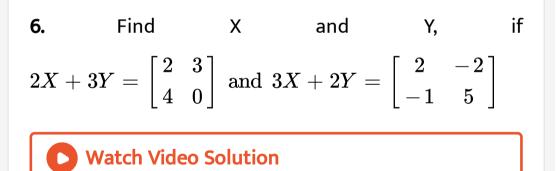
**4.** Find the value of x, y, z from the following equation

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

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

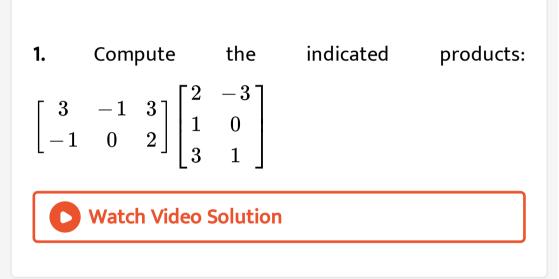
#### equations

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



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

## Solve Examples Section Iii Short Answer Type Questions



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

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

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

AB, BA. Show that AB 
eq BA

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



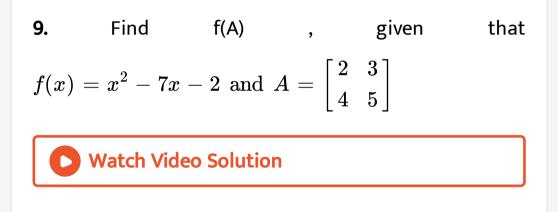
6. If Matrix 
$$A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$$
, then show that  $A^2 - 5A + 7I = 0$  and hence find  $A^{-1}$  from this equation.



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

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

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#### 10. Find the matrix X such that

$$Xiggl[ egin{smallmatrix} 1 & 2 & 3 \ 4 & 5 & 6 \ \end{bmatrix} = iggl[ egin{smallmatrix} -7 & -8 & -9 \ 2 & 4 & 6 \ \end{bmatrix}$$

#### Solve Examples Section Iv Short Answer Type Questions

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

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

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

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

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

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

B' A'

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





6. If A = 
$$\frac{1}{3} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$$
, then verify that AA' = A' A  
= I  
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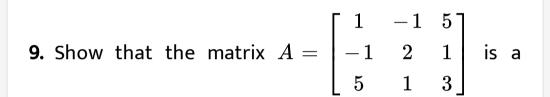
7. For the matrix 
$$A=egin{pmatrix} 1 & 5 \ 6 & 7 \end{pmatrix}$$
 , verify that : A + A' is a

Symmetric Matrix

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

Skew-Symmetric Matrix



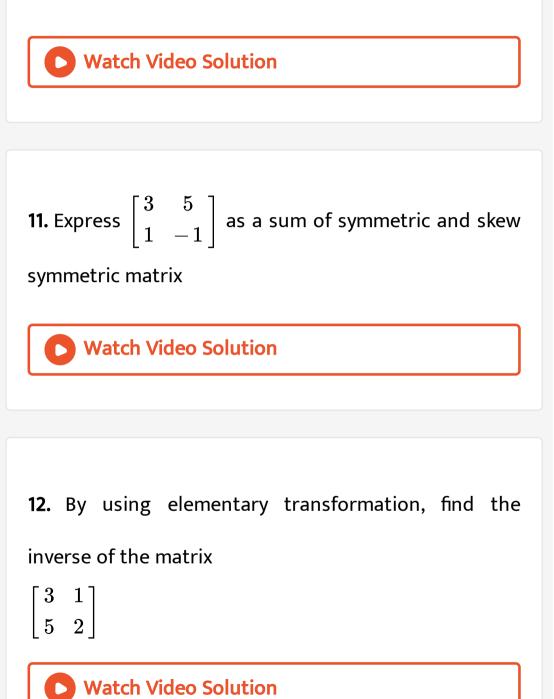


#### symmetric matrix.



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

### symmetric.



13. Using elementary transformations, find the inverse

```
of each of the matrix, if it exists: \begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}
```

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Solve Examples Section V Long Answer Type Questions

1. Let 
$$A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$$
 , show that

 $\left(aI+bA
ight)^n=a^nI+na^{n-1}bA$ , where I is the identity

matrix of order 2 and  $n \in N$ 

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

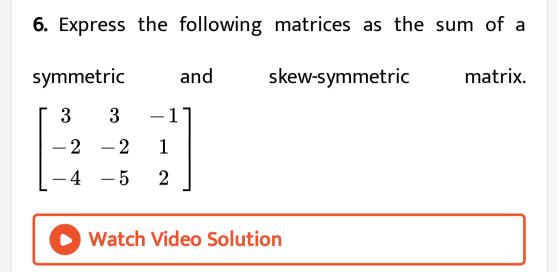
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**3.** f A and B are square matrices of the same order such that AB = BA, then prove by induction that  $AB^n = B^n A$  Further, prove that  $(AB)^n = A^n B^n$  for all  $n \in N$ 

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

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



### 7. Using elementary transformation, find the inverse of

the following matrix

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

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Assignment Section I M C Q

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

A. 12 elements

B. 4 elements

C. 3 elements

D. None of these

Answer: C



**2.** A matrix 2 imes 3 whose elements are  $a_{ij} = \left(i+j
ight)^2$  is

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

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

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

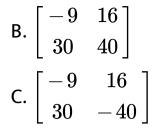
#### Answer: B



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

value of AB is

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



#### Answer: C



**4.** If 
$$A = \begin{bmatrix} 2 & -1 \\ 4 & 2 \end{bmatrix}$$
 and  $B = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$  then  $A + 2B$  is  
A.  $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$   
B.  $\begin{bmatrix} 6 & 5 \\ 6 & 6 \end{bmatrix}$   
C.  $\begin{bmatrix} 6 & 6 \\ 5 & 4 \end{bmatrix}$ 

#### Answer: C



5. If A = 
$$\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$$
 then the value of  $A^2$  is  
A.  $\begin{bmatrix} 1 & 1 \\ 1 & 4 \end{bmatrix}$   
B.  $\begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}$   
C.  $\begin{bmatrix} 2 & -3 \\ -3 & 5 \end{bmatrix}$ 

D. None of these

#### Answer: C



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

A. 
$$\frac{\pi}{6}$$
  
B.  $\frac{\pi}{3}$ 

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

#### **Answer: B**



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

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

equal is

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

A. 1

B. 3

C. 0

D. None of these

Answer: A
<b>Vatch Video Solution</b>
<b>9.</b> 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



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

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

#### Answer: C



1. If a matrix has 8 elements , what are the possible

order it can have ?

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**2.** Construct a 2 imes 2 matrix  $A=\left[a_{ij}
ight]$  whose elements are given by  $a_{ij}=rac{1}{2}|4i-3j|$ 

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

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

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5. Find the value of 'x' if

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

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



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

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

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

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

answer from the following:

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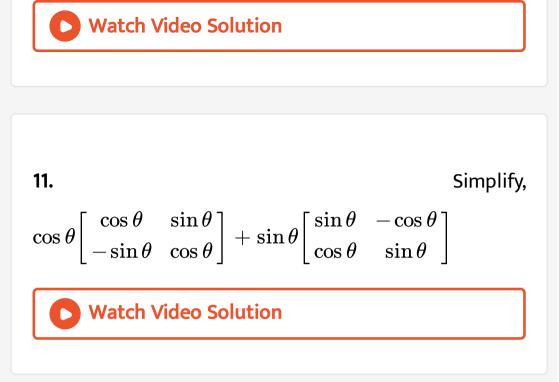
9. If 
$$\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = a + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$$
 , then find

the matrix A

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

the matrix A



**12.** Find matrices X and Y is  

$$2X - Y = \begin{bmatrix} 6 & -6 & 0 \\ -4 & 2 & 1 \end{bmatrix} \text{ and } X + 2Y = \begin{bmatrix} 3 & 2 & 5 \\ -2 & 1 & 7 \end{bmatrix}$$
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**13.** Solve the equation for x, y, z , t

$$2igg[ egin{array}{c} x & y \ z & t \ \end{bmatrix} + 3igg[ egin{array}{c} 1 & -1 \ 0 & 2 \ \end{bmatrix} = 3igg[ egin{array}{c} 3 & 5 \ 4 & 6 \ \end{bmatrix}$$

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

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

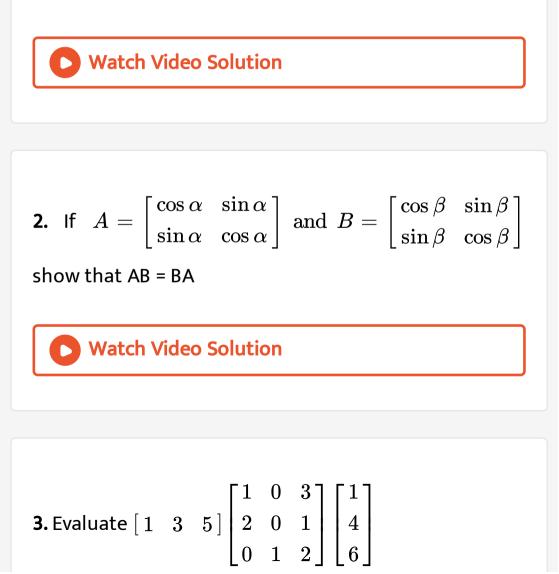
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Assignment Section Iii Short Answer Type Questions

1. Find AB and BA when

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

If AB = BA ? What conclusion do you draw ?





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

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

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

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

value of k

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

# 9. Solve the matrix equation $\begin{bmatrix} 2x & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} x \\ 3 \end{bmatrix} = 0$ Watch Video Solution

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

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



**12.** Solve for x and y, given that

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

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

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

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

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

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

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

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

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

holds :

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

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## Assignment Section Iv Short Answer Type Questions

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

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

find A' - B'

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

that

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

4. 
$$A' = \begin{bmatrix} -3 & 1 \\ 2 & 1 \\ 0 & -2 \end{bmatrix}$$
 and  $B = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & -1 \end{bmatrix}$  verify  
that  
 $(A - B)' = A' - B'$   
**(Note:** Watch Video Solution  
5. If  $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$ , then verify that  $A'A = I$   
**(Note:** Watch Video Solution  
6. If  $A = \begin{bmatrix} 3 \\ 5 \\ 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 & 4 \end{bmatrix}$  find (AB)'

I

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

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

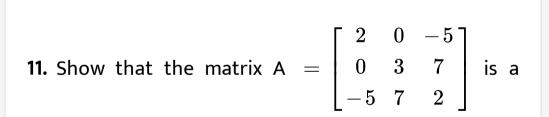
9. If A 
$$=$$
  $\begin{bmatrix} 2\\ -3\\ 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & -4 & 7 \end{bmatrix}$ , verify that (AB)' = B'A'



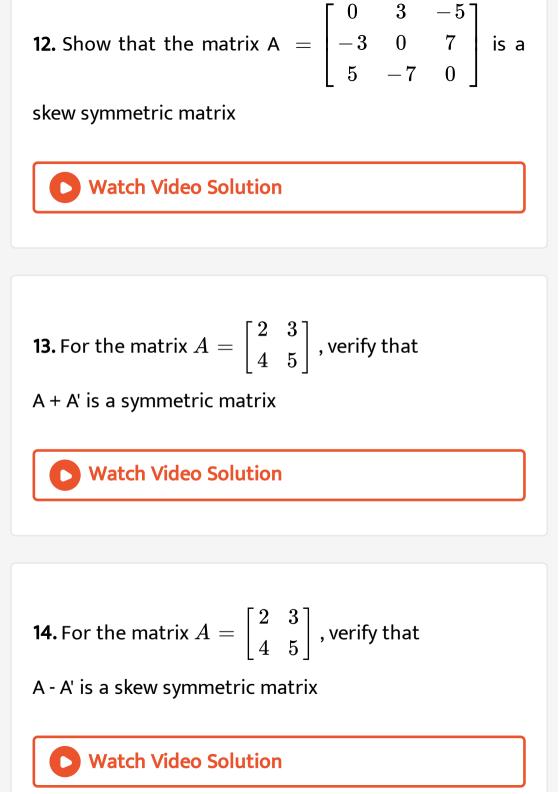
**10.** If A = 
$$\begin{bmatrix} -2 & 0 & 5 \\ 3 & 8 & 7 \end{bmatrix}$$
,  $B = \begin{bmatrix} -1 & 0 \\ 2 & 3 \\ 1 & 4 \end{bmatrix}$ , verify that

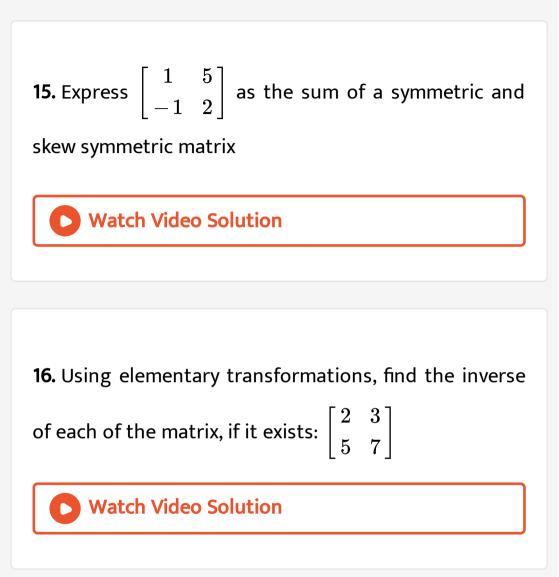
(AB)' = B'A'

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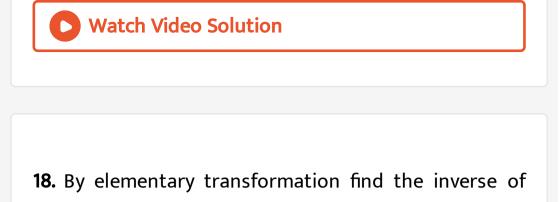
symmetric matrix





17. Using elementary transformations find the inverse

of matrix 
$$A = egin{bmatrix} 1 & -1 \ 2 & 3 \end{bmatrix}$$



### following

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

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## 19. By elementary transformation find the inverse of

following

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

1. Using elementary transformations find the inverse of

the following matrice

$$egin{array}{cc} 3 & -1 \ -4 & 2 \end{array} 
ight]$$

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2. using elementary find the inverse of the following

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

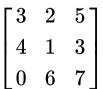
3. 
$$A_lpha = egin{bmatrix} \coslpha & \sinlpha \ -\sinlpha & \coslpha \end{bmatrix}$$
 then prove that  $A_{lpha\,.\,A_eta = A_{lpha+eta}}$ 



$$oldsymbol{4.} A_lpha = egin{bmatrix} \coslpha & \sinlpha \ -\sinlpha & \coslpha \end{bmatrix}$$
 then prove that  $(A^n_lpha = A(nlpha) \ ext{ where } \ n \in N$ 

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

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



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7. Express the following matrices as sum of a

symmetric and a skew symmetric matrix

$$\left[ egin{array}{cc} 1 & 5 \ -1 & 2 \end{array} 
ight]$$

8. Express the following matrices as sum of a

symmetric and a skew symmetric matrix

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

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#### Previous Years Board Questions For Practice M C Q

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

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

2 3 C. [11]

D. none of these

#### Answer: C

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

C. [11]

D. none of these

#### Answer: C



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

A. a unit matrix

B. a diagonal matrix

C. a symmetric matrix

D. a skew symmetric matrix

Answer: D



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

A. unit matrix

B. a diagonal matrix

C. a symmetric matrix

D. a skew symmetric matrix

#### **Answer: D**

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

A. 27

B. 18

C. 81

D. 512

#### Answer: D



## 6. The number of all possible matrices of order 3 imes3

with each entry 0 or 3 is

B. 18

C. 81

D. 512

#### Answer: D



7. If A, B are symmetric matrices of same order, then AB

- BA is a :

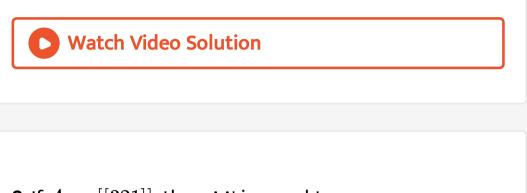
A. Skew symmetric matrix

B. Symmetric matrix

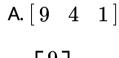
C. Zero matrix

D. Identity matrix

#### Answer: A



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





C. [14]

D. [6]

Answer: C



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

A. a unit matrix

B. a diagonal matrix

C. a scalar matrix

D. none of these

#### Answer: D



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

A. 6

B. 4

C. 5

D. 2

#### Answer: C

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

#### A. 3

B. 6

 $\mathsf{C}.-2$ 

D. 2

#### Answer: D

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**12.** If A is a matrix of order  $2 \times 3$  and B is matrix of order  $3 \times 3$  then AB is matrix of order

A. 2 imes 3

 ${\rm B.3\times2}$ 

 ${\rm C.}\,2\times2$ 

D. 3 imes 3

Answer: C
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<b>13.</b> If matrix A is of order $4 imes 3$ , then each row of matrix
A contains elements :
A. 12
B. 4
C. 3
D. none of these

#### Answer: C



14. Which of the given values of x and y make the

following pair of matrices equal:  $\begin{bmatrix} 3x+7 & 5\\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2\\ 8 & 4 \end{bmatrix}$ 

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

B. Not possible to find

C. 
$$y = 7, x = -rac{2}{3}$$
  
D.  $x = rac{-1}{3}, y = rac{-2}{3}$ 

#### Answer: B



15. If AB = C, where B and C are matrices of order 3 imes 5,

then order of A is :

A. 3 imes 3

 $\text{B.}\,3\times5$ 

 $\mathrm{C.5}\times5$ 

D. 5 imes 3

Answer: A



**Previous Years Board Questions For Practice** 

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



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

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

symmetric matrix



## 4. By using elementary transformation find the inverse

of matrix

$$A=\left[egin{array}{cc} 2&3\-4&7\end{array}
ight]$$

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5. By elementary transformation find the inverse of

#### following

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



## 6. Using elementary transformation find the inverse of

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



7. Show that A + A' is symmetric matrix where 
$$A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$$

8. If A and B are symmetric matrices of same order

then AB - BA is a :

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

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

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

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

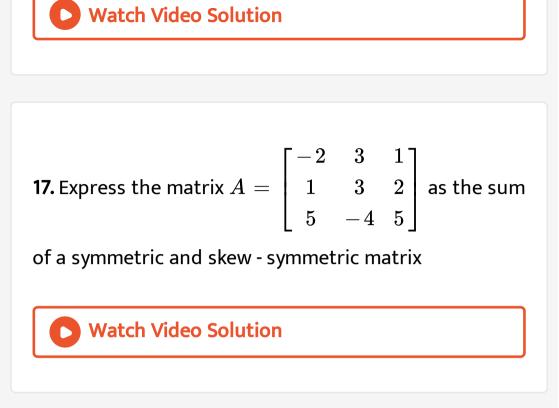
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**13.** Find a 
$$2 \times 2$$
 order matrix B such that  $\begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix} B = \begin{bmatrix} 12 & 11 \\ 2 & 1 \end{bmatrix}$ 

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

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

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



18. Express the following as sum of symmetric and

skew symmetric matrix

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

19. Express the following as sum of symmetric and

skew symmetric matrix

$\lceil 2 \rangle$	4	-67
7	3	5
1	-2	4



20. Express the following as sum of symmetric and

skew symmetric matrix

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

#### 21. Express the following as sum of symmetric and

skew symmetric matrix

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

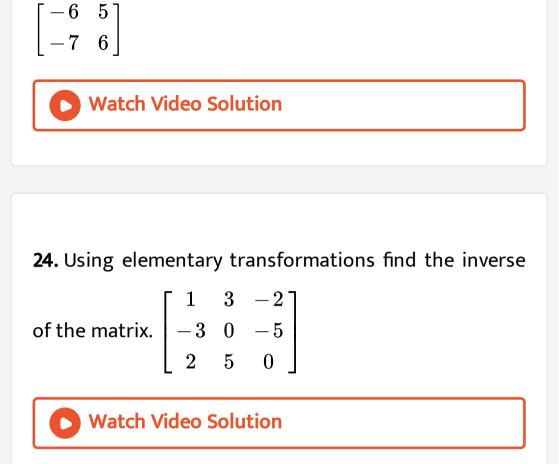
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**22.** By using elementary transformations, find the inverse of the matrix :  $A = \begin{bmatrix} -5 & 4 \\ -6 & 5 \end{bmatrix}$ 

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23. Using elementary find the inverse of the following

matrices



### 25. Using elementary find the inverse of the following

matrices

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

26. Using elementary find the inverse of the following

matrices

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



### 27. Using elementary find the inverse of the following

matrices

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

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

**29.** Construct a 2 imes 3 matrix whose elements in the ith

row and jth column are given by  $a_{ij} = rac{\left(i+j
ight)^2}{2}$ 

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30. Construct a 3 imes 3 matrix whose elements are given

by

 $a_{ij}=2i+j$ 



### **31.** Construct a 3 imes 4 matrix whose elements are given

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

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

33. Using elementary transformations, find the inverse

of each of the matrix, if it exists:  $\begin{bmatrix} 6 & -3 \\ -2 & 1 \end{bmatrix}$ 

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

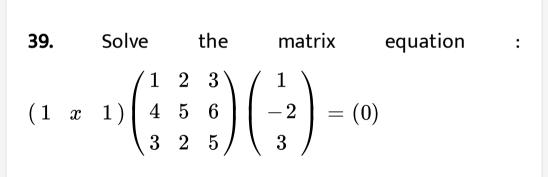
**35.** If 
$$A = \begin{bmatrix} 7 & 2 \\ -1 & 4 \end{bmatrix}$$
 and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  show that  $(A - 5I)(A - 6I) = 0$ 

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

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

**38.** Solve the matrix equation :  $(1 \ x \ 1) \begin{pmatrix} 1 \ 2 \ 3 \\ 4 \ 5 \ 6 \\ 3 \ 2 \ 5 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} = (0)$ 

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# C

**40.** Solve the matrix equation :  $(1 \ 1 \ x) \begin{pmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = (0)$ Watch Video Solution

**41.** By using elementary transformation find the inverse of following

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

### 42. By using elementary transformation find the

inverse of following

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

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### 43. By using elementary transformation find the

inverse of following

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



### 44. By using elementary transformation find the

inverse of following

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

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45. By using elementary transformation find the

inverse of following

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



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

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

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

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

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

A + A' is a symmetric matrix

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

A - A' is a skew symmetric matrix



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

**Skew-Symmetric Matrix** 

#### 53. By using elementary transformation, find the

inverse of the matrix

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



54. Using elementary transformations, find the inverse

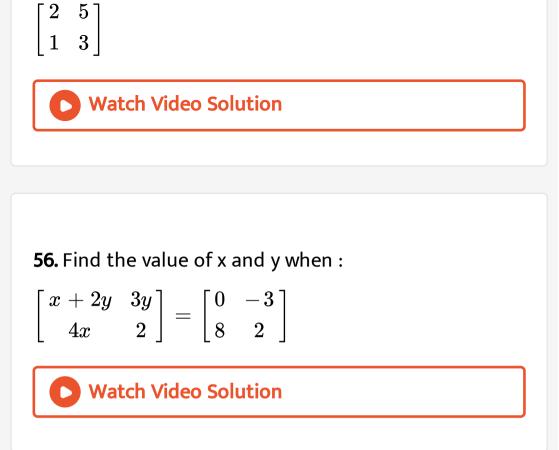
of each of the matrix, if it exists:

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

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55. Using elementary transformation, find the inverse

(if exists) of the following matrices



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

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

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

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



61. Using elementary transformations find the inverse

of matrix 
$$A = egin{bmatrix} 2 & -3 \ -1 & 2 \end{bmatrix}$$

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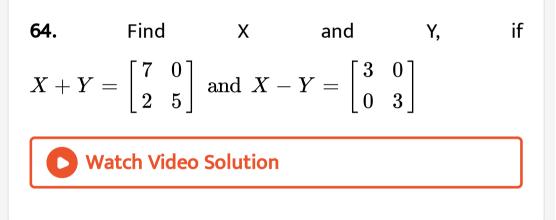
**62.** Construct a 2 imes 3 matrix  $A=\left[a_{ij}
ight]$  whose

elements are given by

$$a_{ij}=rac{-i}{j}$$

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

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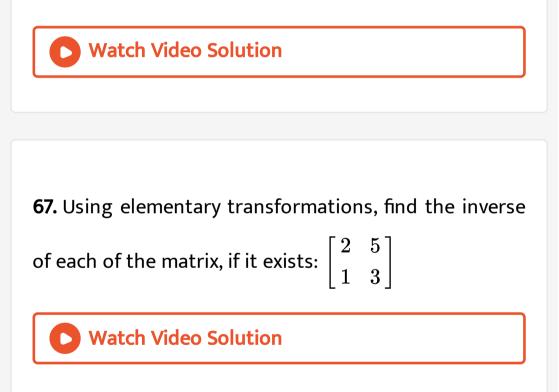
**65.** Find matrices X and Y if : 
$$X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$$
 and  $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$ .

A 1 - L - L - Ministra - Constraint



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

Skew-Symmetric Matrix



68. Using elementary transformations find the inverse

of the matrix.  $\begin{bmatrix} 1 & 3 & -2 \\ -3 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix}$ 

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