

MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

APPLICATION OF MATRICES AND DETERMINANTS

Exercise 11

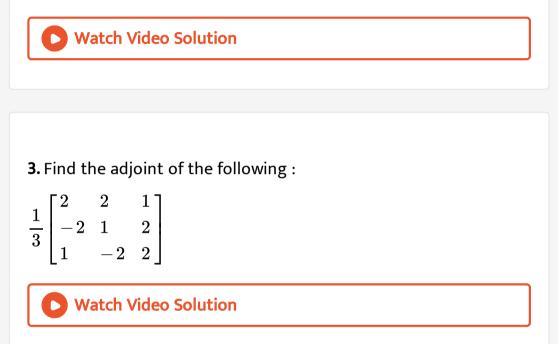
1. Find the adjoint of the following :

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



2. Find the adjoint of the following :

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



4. Find the inverse (if it exists) of the following

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

5. Find the inverse (if it exists) of the following

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



6. Find the inverse (if it exists) of the following

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

Watch Video Solution

7. If F (
$$\alpha$$
) =
$$\begin{bmatrix} \cos \alpha & 0 & \sin \alpha \\ 0 & 1 & 0 \\ -\sin \alpha & 0 & \cos \alpha \end{bmatrix}$$
Show that = F (α)⁻¹ = F(- α)

8. If A =
$$\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$$
, show that $A^2 - 3A - 7I_2 = 0_2$.

Hence find A^{-1} .

Watch Video Solution

9. If
$$A = \frac{1}{9} \begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$$
, prove that $A^{-1} = A^T$.

Watch Video Solution

10. If A=
$$\begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}$$
, verify that A(adj A)= (adj A) A= $|A|I_2$.

11. If A =
$$\begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$$
 and B = $\begin{bmatrix} -1 & -3 \\ 5 & 2 \end{bmatrix}$ verify that $(AB)^{-1} = B^{-1}A^{-1}$.

12. If adj (A) =
$$\begin{bmatrix} 2 & -4 & 2 \\ -3 & 12 & -7 \\ -2 & 0 & 2 \end{bmatrix}$$
, find A.

Watch Video Solution

13. If adj (A) =
$$\begin{bmatrix} 0 & -2 & 0 \\ 6 & 2 & -6 \\ -3 & 0 & 6 \end{bmatrix}$$
 find A^{-1} .

Watch Video Solution

14. Find adj (adj(A)) if adj A =
$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 0 \\ -1 & 0 & 1 \end{bmatrix}$$
.

Watch Video Solution

15.

$$A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix} \text{ show that } A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}.$$

$$\textcircled{Watch Video Solution}$$
16. Find the matrix A for which $A \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 14 & 7 \\ 7 & 7 \end{bmatrix}.$

$$\textcircled{Watch Video Solution}$$

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

find a matrix X such that AXB = C.

18. If
$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$
, show that $A^{-1} = \frac{1}{2} (A^2 - 3I)$



19. Decrypt the received encoded message $\begin{bmatrix} 2 & -3 \end{bmatrix} \begin{bmatrix} 20 & 4 \end{bmatrix}$ with the encryption matrix $\begin{bmatrix} -1 & -1 \\ 2 & 1 \end{bmatrix}$ and the decryption matrix as its inverse where the system of codes are described by the numbers 1-26 to the letters A-Z respectively, and the number 0 to a blank space.

Watch Video Solution

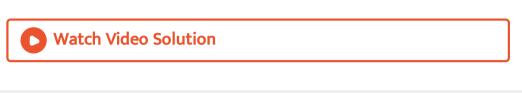
Exercise 12

1. Find the rank of the following matrices by minor method :

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

2. Find the rank of the following matrices by minor method :

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



3. Find the rank of the following matrices by minor method :

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

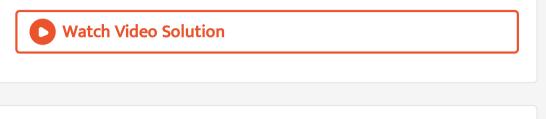
Watch Video Solution

4. Find the rank of the following matrices by minor method :

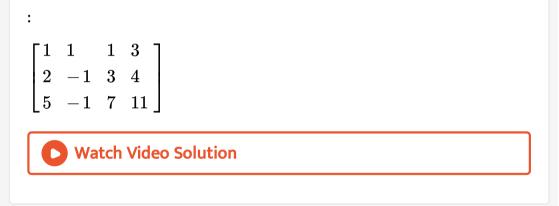
$$egin{bmatrix} 1 & -2 & 3 \ 2 & 4 & -6 \ 5 & 1 & -1 \end{bmatrix}$$

5. Find the rank of the following matrices by minor method :

 $\begin{bmatrix} 0 & 1 & 2 & 1 \\ 0 & 2 & 4 & 3 \\ 8 & 1 & 0 & 2 \end{bmatrix}$



6. Find the rank of the following matrices by row reduction method

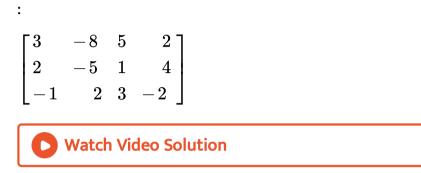


7. Find the rank of the following matrices by row reduction method

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

:





9. Find the inverse of each of the following by Gauss - Jordan

method :

 $\left[\begin{matrix} 2 & -1 \\ 5 & -2 \end{matrix} \right]$

10. Find the inverse of each of the following by Gauss - Jordan

method :

$$egin{array}{cccc} 1 & -1 & 0 \ 1 & 0 & -1 \ 6 & -2 & -3 \end{array}$$

Watch Video Solution

11. Find the inverse of each of the following by Gauss - Jordan

method :

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$$





1. Solve the following system of linear equations by matrix inversion method.

2x+5y = -2,x+2y=-3



2. Solve the following system of linear equations by matrix inversion method.

2x-y=8,3x+2y=-2



3. Solve the following system of linear equations by matrix inversion method.

2x+3y-z=9,x+y+z=9,3x-y-z= -1

4. Solve the following system of linear equations by matrix inversion method.

x+y+z-=2 = 0, 6x-4y+5z-31=0,5x+2y+2z=13.

Watch Video Solution

5. If
$$A = \begin{bmatrix} -5 & 1 & 3 \\ 7 & 1 & -5 \\ 1 & -1 & 1 \end{bmatrix}$$
 and $B = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$, find the products

AB and BA and hence solve the system of equations x+y+2z=1,3x+2y+z=7, 2x+y+3z=2.

Watch Video Solution

6. A man is appointed in a job with a monthly salary of certain amount and a fixed amount of annual increment. If his salary was

Rs 19,800 per month at the end of the first month after 3 years of service and Rs 23,400 per month at the end of the first month after 9 years of service find his starting salary and his annual increment. (Use matrix inversion method to solve the problem.)

Watch Video Solution

7. Four men and 4 women can finish a piece of work jointly in 3 days while 2 men and 5 women can finish the same work jointly in 4 days. Find the time taken by one man alone and that of one woman alone to finish the same work by using matrix inversion method.



8. The prices of three commodities A,B and C are Rs x, y and z per unit respectively. A person P purchases 4 units of B and sells two

units of A and 5 units of C. Person Q purchases 2 units of C and sells 3 units of A and one unit of B. Person R purchases one unit of A and sells 3 unit of B and one unit of C. In the process, PQ and R earn Rs 15,000, Rs 1,000 and Rs 4,000 respectively. Find the prices per unit of A,B and C. (Use matrix inversion method to solve the problem.)



Exercise 14

1. Solve the following systems of linear equation by Cramer's rule:

5x-2y+16=0,x+3y-7=0



2. Solve the following systems of linear equation by Cramer's rule:

$$rac{3}{x}+2y=12, rac{2}{x}+3y=13$$

Watch Video Solution

3. Solve the following systems of linear equation by Cramer's rule:

3x+3y-z=11, 2x-y+2z=9, 4x+3y+2z=25

Watch Video Solution

4. Solve the following systems of linear equation by Cramer's rule:

$$rac{3}{x} - rac{4}{y} - rac{2}{z} - 1 = 0, rac{1}{x} + rac{2}{y} + rac{1}{z} - 2 = 0, rac{2}{x} - rac{5}{y} - rac{4}{z} + 1 = 0$$

5. In a competitive examination, one mark is awarded for every correct answer while $\frac{1}{4}$ mark is deducted for every wrong answer. A student answered 100 questions and got 80 marks. How many questions did he answer correctly? (Use Cramer's rule to solve the problem).



6. A chemist has one solution which is 50% acid and another solution which is 25 % acid. How much each should be mixed to make 10 litres of a 40 % acid solution ? (Use Cramer's rule to solve the problem).



7. A fish tank can be filled in 10 minutes using both pumps A and B simultaneously. However, pump B can pump water in or out at the same rate. If pump B is inadvertently run in reverse, then the tank will be filled in 30 minutes. How long would it take each pump to fill the tank by itself? (Use Cramer's rule to solve the problem).



8. A family of 3 people went out for dinner in a restaurant. The cost of two dosai, three idlies and two vadais is Rs 150. The cost of the two dosai, two idlies and four vadais is Rs 200. The cost of five dosai, four idlies and two vadais is Rs 250. The family has Rs 350 in hand and they ate 3 dosai and six idlies and six vadais. Will they be able to manage to pay the bill within the amount they had?



1. Solve the following systems of linear equations by Gaussian elimination method.

```
2x-2y+3z=2,x+2y-z=3,3x-y+2z=1.
```

Watch Video Solution

2. Solve the following systems of linear equations by Gaussian elimination method.

2x+4y+6z=22,3x+8y+5z=27,-x+y+2z=2



3. If ax^2 +bx+c is divided by x+3,x-5, and x-1, the remainders are 21,

61 and 9 respectively. Find a,b, and c. (Use Gaussian elimination

Watch Video Solution

4. An amount of Rs 65,000 is invested in three bonds at the rates of 6 % , 8% and 10% per annum respectively. The total annual income is Rs 4,800. The income from the third bond is Rs 600 more than that from the second bond. Determine the price of each bond. (Use Gaussian elimination method.)

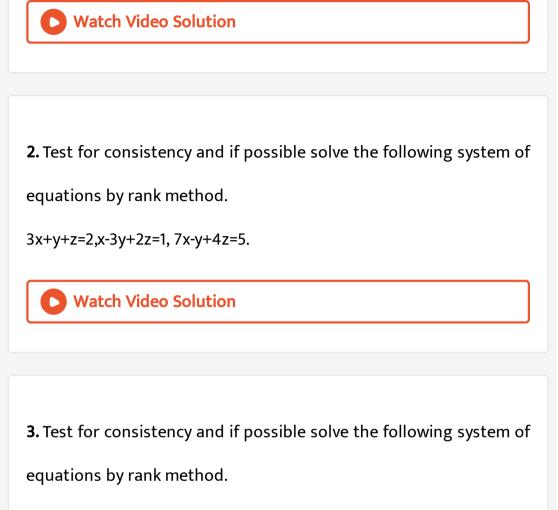


Exercise 16

1. Test for consistency and if possible solve the following system of

equations by rank method.

x-y+2z=2,2x+y+4z=7,4x-y+z=4



2x+2y+z=5,x-y+z=1,3x+y+2z=4



4. Test for consistency and if possible solve the following system of

equations by rank method.

```
2x-y+z=2,6x-3y+3z=6,4x-2y+2z=4.
```



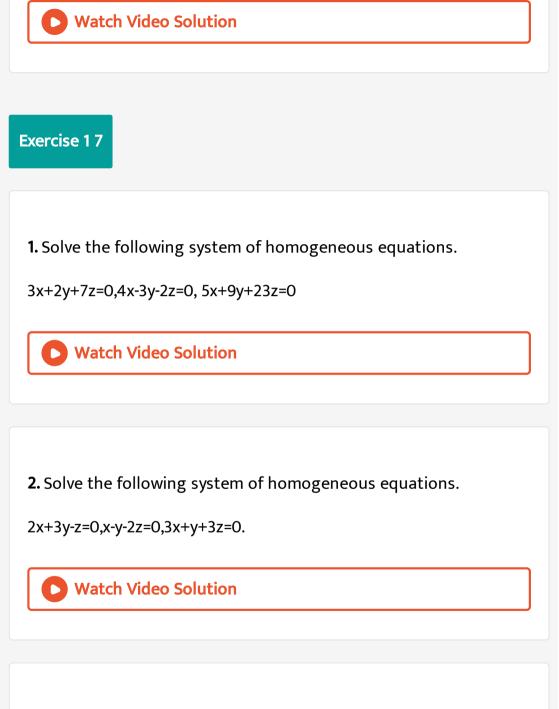
- 5. Find the value of k for which the equations kx-2y+z=1, x-
- 2ky+z=-2,x-2y+kz=1 have
- (i) no solution
- (ii) unique solution
- (iii) infinitely many solution



6. In vestigate the values of λ and μ the system of linear equations

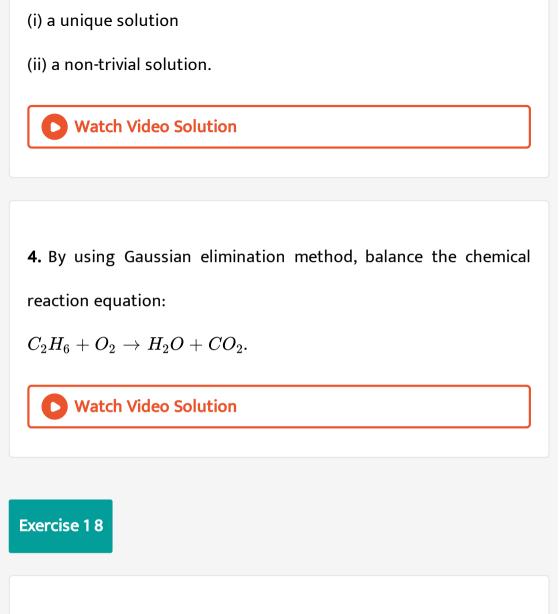
 $2x+3y+5z=9,7x+3y-5z=8, 2x+3y+\lambda z=\mu$, have

- (i) no solution
- (ii) a unique solution
- (iii) an infinite number of solutions.



3. Determine the values of λ for which the following system of

equations x+y+3z=0,4x+3y+ λ z=0, 2x+y+2z=0 has



1. If $\left|adj(adjA)
ight|=\left|A
ight|^9$ square matrix A is

A. 3

B. 4

C. 2

D. 5

Answer: D

Watch Video Solution

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

A. A

B. B

 $\mathsf{C}.\,I_3$

 $\mathsf{D}.\,B^T$

Answer: C

3. A=
$$\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$$
, B=adj A and C =3A, then $\frac{|adjB|}{|C|}$ =
A. $\frac{1}{3}$
B. $\frac{1}{9}$
C. $\frac{1}{4}$
D. 1

Answer: A



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

$$C. \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$$
$$D. \begin{bmatrix} 4 & -1 \\ 2 & 1 \end{bmatrix}$$

Answer: A::B::D



5. If
$$A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$$
, then $9I_2 - A =$
A. A^{-1}
B. $\frac{A^{-1}}{2}$
C. $3A^{-1}$
D. $2A^{-1}$

Answer: A::B



6. If $A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj(AB)| =A. -40 B. -80 C. -60 D. -20

Answer:

Watch Video Solution

7. If P =
$$\begin{vmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{vmatrix}$$
 is the adjoint of 3×3 matrix A and |A|=4, then

x is

A. 15

B. 12

C. 14

D. 11

Answer: A



8. If
$$A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$$
 and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the

value of a_{23} is

A. 0

 $\mathsf{B.}-2$

 $\mathsf{C.}-3$

 $\mathsf{D}.-1$

Answer: A



9. If A, B and C are invertible matrices of some order, then which one of the following is not true?

A. adj A = $|A|A^{-1}$

B. adj (AB) = (adj A) (adj B)

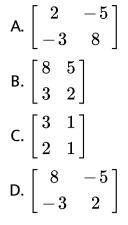
C. det
$$A^{-1}$$
 = (det $A)^{-1}$

D.
$$(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$$

Answer: A::B::D



10. If
$$(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$$
 and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$ then B^{-1} =



Answer: B::C



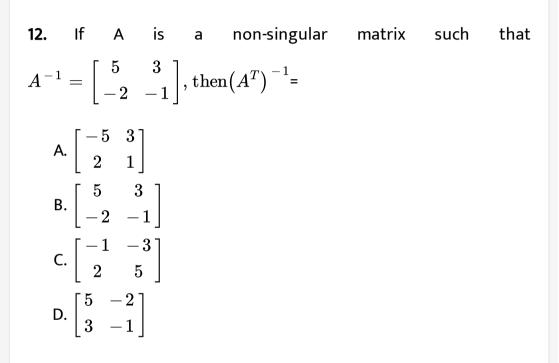
11. If
$$A^T$$
. A^{-1} is symmetric, then A^2 =

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

B. $(A^{T})^{2}$
C. A^{T}
D. $(A^{-1})^{2}$

Answer: A::B





Answer: A::B::C

13. A =
$$\begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$$
 and $A^T = A^{-1}$, then the value of x is
A. $\frac{-4}{5}$
B. $\frac{-3}{5}$
C. $\frac{3}{5}$
D. $\frac{4}{5}$

Answer: D

14. If
$$A = \begin{bmatrix} 1 & \tan \frac{\theta}{2} \\ -\tan \frac{\theta}{2} & 1 \end{bmatrix}$$
 and $AB = I_2$, then $B=$
A. $\left(\cos^2 \frac{\theta}{2}\right)A$
B. $\left(\cos^2 \frac{\theta}{2}\right)A^T$

C.
$$(\cos^2 \theta) I$$

D. $\left(\sin^2 \frac{\theta}{2}\right) A$

Answer: A::B::C



15.
$$A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$$
 and A (adj A) = $\begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$, then =k

A. 0

 $\mathsf{B.}\sin\theta$

 $C.\cos\theta$

D. 1

Answer: A

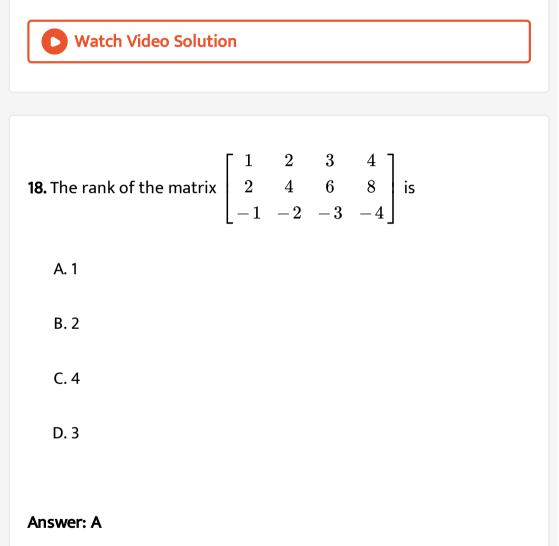
16. If
$$A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$$
 be such that $\lambda A^{-1} = A$, then λ is
A. 17
B. 14
C. 19
D. 21

Answer: A

17. If adj A =
$$\begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$$
 and adj B = $\begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then adj (AB) is
A. $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$
B. $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$
C. $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$

$$\mathsf{D}. \begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$$

Answer: A::B





$$x^ay^b=e^m, x^cy^d=e^n, \Delta_1=egin{bmatrix}m&b\n&d\end{bmatrix}\Delta_2=egin{bmatrix}a&m\c&n\end{bmatrix}, \Delta_3=egin{bmatrix}a&b\c&d\end{bmatrix}$$

then the value of x and y are respectively.

A.
$$e^{(\Delta_2 / \Delta_1)}$$
, $e^{(\Delta_3 / \Delta_1)}$
B. $\log(\Delta_1 / \Delta_3)$, $\log(\Delta_2 / \Delta_3)$
C. $\log(\Delta_2 / \Delta_1)$, $\log(\Delta_3 / \Delta_1)$
D. $e^{(\Delta_1 / \Delta_3)}$, $e^{(\Delta_2 / \Delta_3)}$

Answer: A::B::C::D

Watch Video Solution

20. Which of the following is/are correct?

(i) Adjoint of a symmetric matrix is also a symmetric matrix.

(ii) Adjoint of a diagonal matrix is also a diagonal matrix.

lf

(iii) If A is a square matrix of order n and λ is a scalar, then adj (λA) = λ^n adj(A)

(iv) A (adj A) = (adj A) A = |A|I

A. Only (i)

B. (ii) and (iii)

C. (iii) and (iv)

D. (i), (ii) and (iv)

Answer: A::D



21. If ρ (A) = ρ ([A|B]), then the system AX = B of linear equations is

A. consistent and has a unique solution

B. consistent

C. consistent and has infinitely many solution

D. inconsistent

Answer: C

Watch Video Solution

22. If
$$0 \le \theta \le \pi$$
 and the system of equations x+(sin θ) $y - (\cos \theta)z = 0$, $(\cos \theta)x - y + z = 0$, $(\sin \theta)x + y - z = 0$

has a non -trivial solution then θ is

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

B. $\frac{3\pi}{4}$
C. $\frac{5\pi}{6}$
D. $\frac{\pi}{4}$

Answer: D

23. The augmented matrix of a system of linear equations is $\begin{bmatrix}
1 & 2 & 7 & 3 \\
0 & 1 & 4 & 6 \\
0 & 0 & \lambda - 7 & \mu + 5
\end{bmatrix}$. The system has infinitely many solutions if

A.
$$\lambda=7, \mu
eq-5$$

B.
$$\lambda=-7, \mu=-5$$

C.
$$\lambda
eq 7, \mu
eq -5$$

D.
$$\lambda=7, \mu=-5$$

Answer: A::B::D

Watch Video Solution

24. Let
$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$
 and $4B = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & x \\ -1 & 1 & 3 \end{bmatrix}$.

If B is the inverse of A, then the value of x is

A. 2	
B. 4	
C. 3	
D. 1	

Answer: A



25. If A =
$$\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$$
, then adj (adj A) is
A.
$$\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$$

B.
$$\begin{bmatrix} 6 & -6 & 8 \\ 4 & -6 & 8 \\ 0 & -2 & 2 \end{bmatrix}$$

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

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

Answer: A::B::C::D



1. The system of linear equations x +y+z =6, x+2y+3z= 14 and 2x+5y+

 $\lambda z = \mu(\lambda, \mu \in \mathrm{RR})$ is consistent with unique solution if

A.
$$\lambda=8$$

B.
$$\lambda=8,\,\mu
eq36$$

 $\mathsf{C}.\,\lambda\neq 8$

D. none

Answer: A::B::D

Watch Video Solution

2. If the system of equations x= cy +bz, y=az +cx and z=bx+ay has a

non - trivial solution then

A.
$$a^2 + b^2 + c^2$$
=1

B. abc \neq 1

C. a+b+c=0

D.
$$a^2+b^2+c^2+2abc=1$$

Answer: A::B::C

3. Let A be a 3×3 matrix and B its adjoint matrix If |B|= 64, then |A|

A. ± 2

=

 ${\rm B.}\pm4$

 $\mathsf{C}.\pm 8$

 $\mathsf{D}.\pm12$

Answer:

Watch Video Solution

4. If A^T is the transpose of a square matrix A, then

A.
$$\left|A
ight|
eq \left|A^{T}
ight|$$

B.
$$|A| = \left|A^{T}\right|$$

C. $|A| + \left|A^{T}\right|$ =0
D. $|A| = \left|A^{T}\right|$ only

Answer: A



5. The number of solutions of the system of equations 2x+y=4, x-

2y=2, 3x+5y=6 is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A



6. If A is a square matrix that |A|= 2, than for any positive integer n ,

A. 0 B. 2n C. 2ⁿ D. n²

 $|A^n| =$

Answer: B

Watch Video Solution

7. The system of linear equations x+y+z =2, 2x+y-z=3, 3x+2y+kz= has

a unique solution if

A. k
eq 0

B. -1 < k < 1

 $\mathsf{C}.-2 < k < 2$

D. k=0

Answer:



8. If A is a square matrix of order n, then |adj A|=

- A. $\left|A
 ight|^{n-1}$
- $\mathsf{B.}\left|A\right|^{n-2}$
- $\mathsf{C.}\left|A\right|^{n}$

D. none

Answer: A



9. If the system of equations x + 2y-3x=2, (k+3) z=3, (2k+1) y+z=2 is

inconsistent then k is

A.
$$-3, -\frac{1}{2}$$

B. $-\frac{1}{2}$
C. 1

D. 2

Answer: A::B::C



10. If A =
$$\begin{pmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{pmatrix}$$
 and A (adj A) = $\lambda \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then λ is

A. sinx cos x

B. 1

C. 2

D. none

Answer: B



11. If A is a matrix of order $m imes n, \,\,$ then ho (A) is

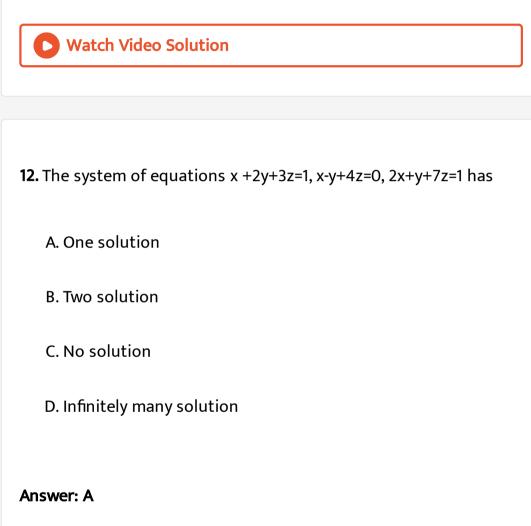
A. m

B.n

C. \leq min (m,n)

D. \geq min (m,n)

Answer:



> Watch Video Solution

13. If ρ (A) = ρ ([A/B]) = number of unknowns, then the system is

A. consistent and has infinitely many solutions

B. consistent

C. inconsistent

D. consistent and has unique solution.

Answer: A::C::D

Watch Video Solution

14. Which of the following is not an elementary transformation ?

- A. $R_i \leftrightarrow R_j$
- B. $R_i
 ightarrow 2R_i + R_j$

 $\mathsf{C}.\,C_j\to C_j+C_i$

D.
$$R_i
ightarrow R_i + C_j$$

Answer: C



- **15.** If ρ (A) =r then which of the following is correct?
 - A. all the minors of order in which do not vanish
 - B. A' has at least one minor of order r which does not vanish

and all higher order minors vanish

- C. A' has at least one (r+1) order minor which vanish
- D. all (r+1) and higher order minors should not vanish

Answer: A::B::C::D

Additional Questions Ii Fill In The Blanks

- 1. Every homogeneous system
 - A. Is always consistent
 - B. Has only trivial solution
 - C. Has infinitely many solution
 - D. Need not be consistent

Answer: A::C



2. If $ho(A)
eq
ho([A \mid B])$, then the system is

A. consistent and has infinitely many solutions

B. consistent and has a unique solution

C. consistent

D. inconsistent

Answer: C

Vatch Video Solution

3. In the non-homogeneous system of equations with 3 unknowns

if $ho(A)=
ho([A\mid B])$ =2, then the system has

A. unique solution

B. one parameter family of solution

C. two parameter family of solutions

D. in consistent

Answer: A

4. Cramer's rule is applicable only when

A.
$$\Delta
eq 0$$

B. $\Delta = 0$

C.
$$\Delta=0, \Delta_x=0$$

D.
$$\Delta_x = \Delta_y = \Delta_z = 0$$

Answer: A::D

Watch Video Solution

5. In a homogeneous system if $ho(A) =
ho([A \mid 0]) < ext{ the number}$

of unknowns then the system has.....

A. trivial solution

B. only non-trivial solution

C. no solution

D. trivial solutions and infinitely many non-trivial solutions

Answer: A::D

Watch Video Solution

6. In the system of equations with 3 unknowns, if $\Delta=0$ and one of $\Delta_x, \Delta_y, {
m of} \Delta_z$ is non zero then the system is

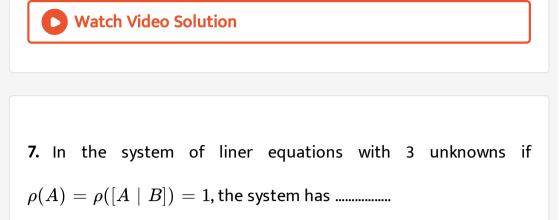
A. Consistent

B. inconsistent

C. consistent with one parameter family of solutions

D. consistent with two parameter family of solutions

Answer: C



A. unique solution

B. inconsistent

C. consistent with 2 parameter family of solution

D. consistent with one parameter family of solution.

Answer: A::B::C



8. If A = [2 0 1] then the rank of AA^T is

A.	1
В.	2
C.	3

D. 0

Answer: A





A.
$$\left|\frac{1}{A^2}\right|$$

B. $\frac{1}{|A|^2}$
C. $\left|\frac{1}{2}\right|$
D. $\frac{1}{|A|}$

Answer: d



10. In a square matrix the minor M_{ij} and the co-factor A_{ij} of and element a_{ij} are related by

A.
$$A_{ij} = -M_{ij}$$

B. $A_{ij} = M_{ij}$
C. $A_{ij} = (-1)^{i+j} M_{ij}$
D. $A_{ij} = (-1)^{i-j} M_{ij}$

Answer: A

Watch Video Solution

Additional Questions Iv Choose The Odd Man Out

1. The rank of any 3 imes 4 matrix is

A. May be 1

B. May be 2

C. May be 3

D. May be 4

Answer: A::B::D

Vatch Video Solution

2. If A is symmetric then

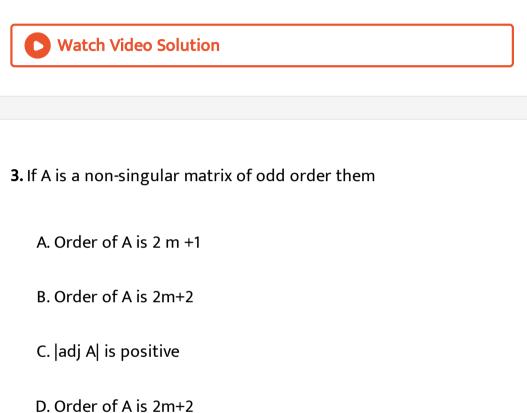
A. A^T =A

B. adj A is symmetric

C. adj $\left(A^{T}
ight)=\left(adjA
ight)^{T}$

D. A is orthogonal

Answer: A



Answer:

Watch Video Solution

4. If A is a orthogonal matrix, then

$$A. AA^T = A^T A = I$$

B. A is non-singular

C. |A| =0

 $\mathsf{D}.\,A^{\,-\,1}=A^T$

Answer: A



5. A matrix which is obtained from an identity matrix by applying only one elementary transformation is

A. Identity matrix

B. Elementary matrix

C. Square matrix

D. Equivalent of identify matrix

Answer: A::D

Watch Video Solution

Additional Questions V Choose The Incorrect Answer

1. In an echelon form which of the following is incorrect?

A. Every row of A which has all its entries 0 occurs below every

row which has a non-zero entry.

- B. The first non-zero entry in each non-zero row is 1
- C. The number of zeros before the first non-zero element in a

row is less than the number of such zeros in the next row

D. Two row can have same number of zeros before the first non-

zero entry

Answer: b

Watch Video Solution

2. Which of the following elementary transformation is not correct

?

A.
$$R_i o R_i + 2R_j$$

B. $C_i o C_i - C_j$
C. $R_i o 7R_i + rac{5}{3}R_j$
D. $C_i o C_i - R_j$

Answer: C

3. It A is an invertible matrix, then which of the following is not true.

A.
$$(A^2)^{-1} = (A^{-1})^2$$

B. $|A^{-1}| = |A|^{-1}$
C. $(A^T)^{-1} = (A^{-1})^T$
D. $|A| \neq 0$

Answer: A::B

Watch Video Solution

4. The matrix
$$\begin{bmatrix} 5 & 10 & 3 \\ -2 & -4 & 6 \\ -1 & -2 & x \end{bmatrix}$$
 is a singular matrix if the value of x

A. 3

B. non-existent

C. All values of x

D. none of the above

Answer: C



5. The number of solutions of the system of equations 2x+y-z=7,x-

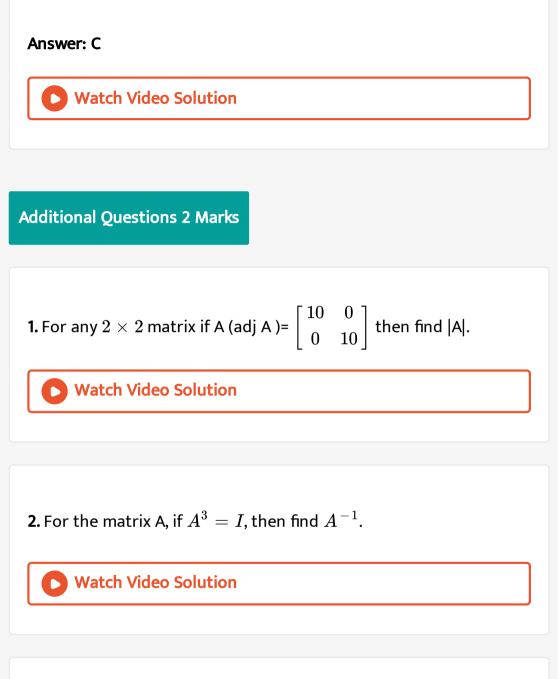
3y+2z=1, x+3y-3z=5 is

A. 0

B. 3

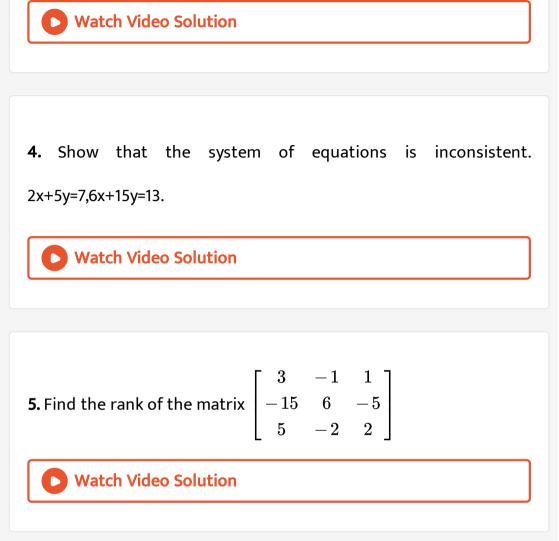
C. No solution

D. inconsistent



3. If A is a square matrix such that $A^3=I$, then prove that A is

non-singular

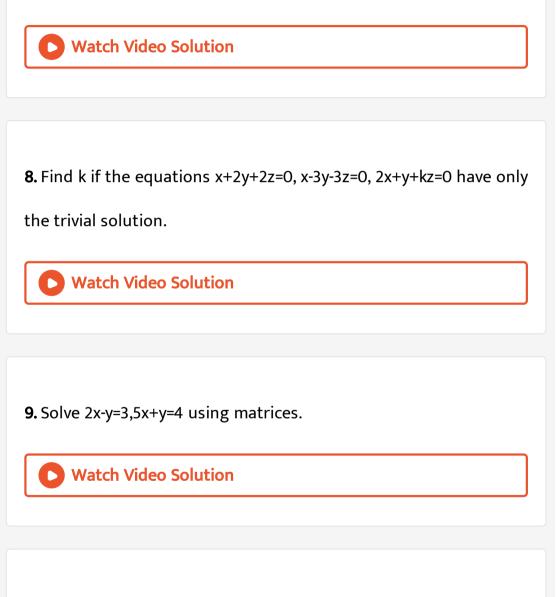


6. Find the rank of matrix A =
$$\begin{bmatrix} 4 & 5 & -6 & 1 \\ 7 & -3 & 0 & 8 \end{bmatrix}$$
.

Watch Video Solution

7. Show that the equations 3x+y+9z=0, 3x+2y+12z=0 and 2x+y+7z=0

have non-trival solutions also.



10. Solve 6x-7y=16, 9x-5y=35 using (Cramer's rule).

D Watch Video Colution



Additional Questions 3 Marks

1. Solve 2x+3y=10, x+6y=4 using Cramer's rule.

Watch Video Solution		

2. For what value of t will the system tx+3y-z=1, x+2y+z=2, -

tx+y+2z=-1 fail to have unique solution ?

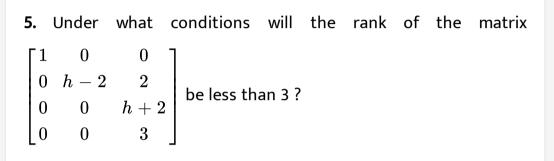
Watch Video Solution

3. Solve $3x+ay=4, 2x+ay=2, a \neq 0$ by Cramer's rule.

Watch Video Solution

4. Verify
$$(AB)^{-1} = B^{-1}A^{-1}$$
 for A = $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$ and B= $\begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix}$.

Watch Video Solution

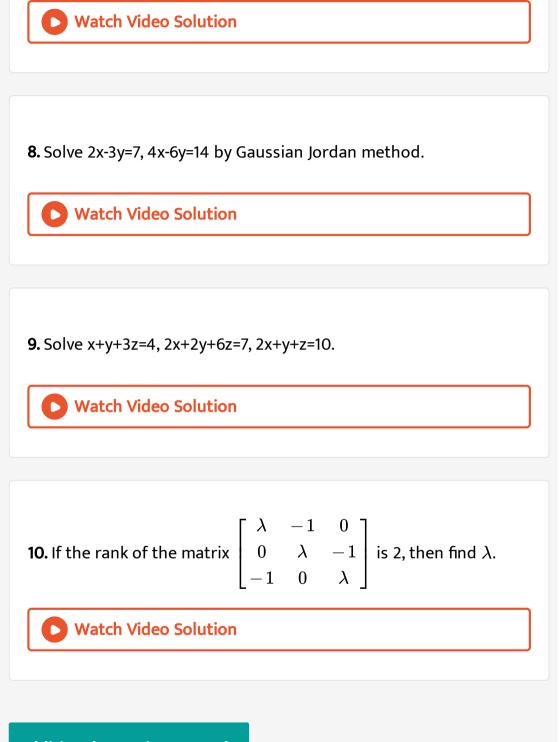


Watch Video Solution

6. Find the rank of the matrix math
$$\begin{bmatrix} 4 & 4 & 0 & 3 \\ -2 & 3 & -1 & 5 \\ 1 & 4 & 8 & 7 \end{bmatrix}$$

Watch Video Solution

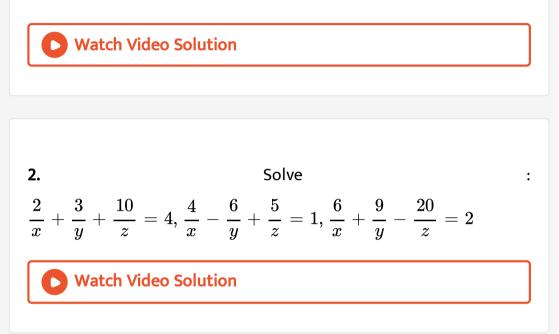
7. Verify that
$$ig(A^{-1}ig)^T=ig(A^Tig)^{-1}$$
 for A = $ig[ig-2 & -3\ 5 & -6ig]$



Additional Questions 5 Marks

1. Using determinants find the quadratic defined by $f(x)=ax^2+bx+c$,

if f(1)=0, f(2)=-2 and f(3) = -6.



3. The sum of three numbers is 20. If we multiply the third number by 2 and add the first number to the result we get 23. By adding second and third numbers to 3 times the first number we get 46. Find the numbers using Cramer's rule. **4.** For what value of λ , the system of equations x+y+z=1, x+2y+4z= λ , x+4y+10z= λ^2 is consistent Watch Video Solution 5. Show that the equations -2x+y+z=a,x-2y+z=b,x+y-2z=c are consistent only if a+b+c=0. Watch Video Solution