MATHS

NCERT - FULL MARKS MATHS(TAMIL)

APPLICATIONS OF MATRICES AND DETERMINANTS

Exercise 1 1

1. Find the adjoint of the

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

View Text Solution

2. Find the adjoint of the

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

View Text Solution

3. Find the adjoint of the

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

View Text Solution

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

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

View Text Solution

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

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

View Text Solution

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

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

View Text Solution

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

View Text Solution

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

View Text Solution

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

View Text Solution

10. Find the matrix A for which A $\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 14 & 7 \\ 7 & 7 \end{bmatrix}$.

View Text Solution

11. Given 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 .

View Text Solution

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

View Text Solution

Exercise 1 2

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

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

View Text Solution

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

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

View Text Solution

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

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

View Text Solution

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

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

View Text Solution

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

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

View Text Solution

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

$$\begin{bmatrix} 1 & 1 & 1 & 3 \\ 2 & -1 & 3 & 4 \\ 5 & -1 & 7 & 11 \end{bmatrix}$$

View Text Solution

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

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

View Text Solution

8. Find the rank of the matrices by row reduction method:

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

View Text Solution

9. Find the inverse of each of the by Gauss-Jordan method:

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

View Text Solution

10. Find the inverse of each of the by Gauss-Jordan method:

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

View Text Solution

11. Find the inverse of each of the by Gauss-Jordan method:

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

View Text Solution

Exercise 1 3

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

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

View Text Solution

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

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

View Text Solution

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

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

View Text Solution

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

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

View Text 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 productsAB and BAand hence solve the system of equations x+y+2z = 1,3x+2y+z =7 , 2x+y+3z=2.

View Text 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 रु19,800 per month at the end of the first month after 3 years of service and रु 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.)

View Text 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.

View Text Solution

8. The prices of three commodities AB , and C are रु x,y , and z per units 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 रु 15,000, रु 1,000 and रु 4,000 respectively. Find the prices per unit of AB , and C . (Use matrix inversion method to solve the problem.)

View Text Solution

Exercise 1 4

1. Solve the systems of linear equations by Cramer’s rule:

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

View Text Solution

2. Solve the systems of linear equations by Cramer’s rule:

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

View Text Solution

3. Solve the systems of linear equations by Cramer’s rule:

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

View Text Solution

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

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

View Text Solution

5. In a competitive examination, one mark is awarded for every correct answer while $\frac{1}{3}$ 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).

View Text Solution

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).

View Text Solution

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).

View Text Solution

8. A family of 3 people went out for dinner in a restaurant. The cost of two dosai, three idlies and two vadais is रु 150. The cost of the two dosai, two idlies and four vadais is रु 200. The cost of five dosai, four idlies and two vadais is रु 250. The family has रु 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 ?

View Text Solution

Exercise 1 5

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

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

View Text Solution

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

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

View Text Solution

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 method.)

View Text Solution

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

View Text Solution

5. A boy is walking along the path $y = ax^2 + bx + c$ through the points (-6,8) (-2,-12) and (3,8). He wants to meet his friend at P(, 7,60) . Will he meet his friend? (Use Gaussian elimination method.)

View Text Solution

Exercise 1 6

1. Test for consistency and if possible, solve the following systems of equations by rank method.

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

View Text Solution

View Text Solution

2. Test for consistency and if possible, solve the following systems of equations by rank method.

3x+y+z=2 , x-3y+2z=1, 7x-y+4z=5

View Text Solution

3. Test for consistency and if possible, solve the following systems of equations by rank method.

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

View Text Solution

4. Test for consistency and if possible, solve the following systems of equations by rank method.

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

View Text Solution

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

View Text Solution

6. Investigate 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.

View Text Solution

Exercise 1 7

1. Solve the system of homogenous equations.

3x+2y+7z=0 , 4x-3y-2z=0 , 5x+9y+23z=0

View Text Solution

2. Solve the system of homogenous equations.

2x+3y-z=0 , x-y-2z=0 ,3x+y+3z=0

View Text Solution

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

x+y+3z=0 , 4x+3y $+\lambda z = 0,$ 2x+y+2z=0 has

(i) a unique solution (ii) a non-trivial solution.

View Text Solution

4. By using Gaussian elimination method, balance the chemical reaction equation:

$C_2H_6 + O_2 \rightarrow H_2O + CO_2$

View Text Solution

Exercise 1 8

1. If |adj(adj A) | =$|A|^9$ then the order of the square matrix A is

A. 3

B. 4

C. 2

D. 5

Answer: B

View Text Solution

2. If A is a 3×3 non -singular matrix such that $\forall^T = A^T A$ and $B =$ A^(-1) A^(T)$then$BB^(T)` =

A. A

B. B

C. I_3

D. B^T

Answer: C

View Text Solution

3. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, 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: B

View Text Solution

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: C

View Text Solution

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: D

View Text Solution

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: B

View Text Solution

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

A. 15

B. 12

C. 14

D. 11

Answer: D

View Text Solution

8. If A = $[(3, 1, \ -1), (2, \ -2, 0), (1, 2-1)]$ and

$$A^{-1} = \begin{bmatrix} a_1 & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

A. 0

B. -2

C. -3

D. -1

Answer: D

View Text Solution

9. If AB , 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) (adjB)

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

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

Answer: B

View Text Solution

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

A. $[(2, -5), (-, 3, 8)]$

B. $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$

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

D. $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

Answer: A

View Text Solution

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: B

View Text Solution

12. If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$ then $\left(A^{-T}\right)^{-1}$ =

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

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

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

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

Answer: D

View Text Solution

13. If 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: A

View Text Solution

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. $\left(\cos^2 \theta\right) I$

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

Answer: B

View Text Solution

15. If 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

B. sin θ

C. cos θ

D. 1

Answer: D

View Text Solution

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: C

View Text Solution

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. $[(-7, 7,), (-1, -9)]$

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

Answer: B

View Text Solution

18. The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ -1 & -2 & -3 & -4 \end{bmatrix}$ is

A. 1

B. 2

C. 4

D. 3

Answer: A

View Text Solution

19. If

$$x^a y^b = e^m, x^c y^d = e^n, \Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}, \Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}, \Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$$

then the values of x and y are respectively

A. $e^{(\Delta_2 / \Delta_1)}, e^{(\Delta_3 / \Delta_1)}$

B. $\log\left(\Delta_{1/\Delta_3}, \log(\Delta_2/\Delta_3)\right.$

C. $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$

D. $e^{(\Delta_1 / \Delta_3)}, e^{(\Delta_2 / \Delta_3)}$

Answer: D

View Text 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.

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

(iv) A(adjA) = (adjA) =A|A|I

A. Only (i)

B. (ii) and (iii)

C. (iii) and (iv)

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

Answer: D

View Text Solution

21. If $\rho(A) = \rho([A \mid B])$ 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: B

View Text Solution

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

View Text Solution

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

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

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

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

Answer: D

View Text Solution

24. Let A = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and $4B = [(3, 1 - 1), (1, 3, x), (- 1, 1, 3)]$. If B is the iverse of A , then the value of x is

A. 2

B. 4

C. 3

D. 1

Answer: D

View Text Solution

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

View Text Solution