



APPLIED MATHEMATICS

2. ALGEBRA

Name: _____

Date: _____

Class: XII Sec: _____

- If A is a square matrix of order 3 and $|A| = -2$, then $|adj(A)|$ is equal to
(a) -8 (b) -2 (c) 0 (d) 4
- In a 3×3 matrix A, value of $a_{12}c_{13} + a_{22}c_{23} + a_{32}c_{33}$, where c_{ij} is the cofactor of a_{ij} is
(a) 0 (b) -1 (c) 1 (d) $|A|$
- If two square matrices A and B are such that $|AB| = 12$ and $|B| = -4$, then value of $|A|$ is:
(a) 8 (b) -8 (c) -3 (d) 16
- If solving a system of linear equations in 3 variables by Cramer's rule, we get $\Delta = 0$ and at least one of $\Delta_x, \Delta_y, \Delta_z$ is non-zero then the system of linear equations has
(a) no solution (b) unique solution
(c) infinitely many solutions (d) trivial solution
- If $\begin{vmatrix} 2x & -1 \\ 4 & 2 \end{vmatrix} = \begin{vmatrix} 3 & 0 \\ 2 & 1 \end{vmatrix}$, then the value of x is
a) $\frac{1}{4}$ b) $-\frac{1}{4}$ c) $\frac{1}{2}$ d) $-\frac{1}{2}$
- If A is a square matrix of order 3×3 , then value of $|3A|$ is
a) $3|A|$ b) $9|A|$ c) $27|A|$ d) none of these
- If $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ -1 & 1 \end{bmatrix}$, then the value of $|AB|$ is
a) 28 b) -28 c) 56 d) -56
- The value of k for which the matrix $\begin{bmatrix} k & 2 \\ 3 & 4 \end{bmatrix}$ has no inverse is _____
a) 4 b) 2 c) 3 d) $\frac{3}{2}$
- If A is square matrix of order 3 with $|A| = 9$, then value of $|A^{-1}| =$ _____



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- a) 1 b) 9 c) $\frac{1}{9}$ d) 0

10. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then $\text{adj.}A$ is

- a) $\begin{bmatrix} -d & -b \\ -c & a \end{bmatrix}$ b) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ c) $\begin{bmatrix} d & b \\ c & a \end{bmatrix}$ d) $\begin{bmatrix} d & c \\ b & a \end{bmatrix}$

11. If matrix $A = \begin{pmatrix} a & b & -5 \\ c & d & 0 \\ 5 & 0 & 0 \end{pmatrix}$ is skew symmetric, then value of $2a + b + c - 3d$

is _____.

12. If $\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is skew -symmetric, matrix, then find value of $a+b+c$

13. If A is a square matrix $\begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$ such that $A^2 = pA$, then find the value of p .

14. Cost of two toys A and B are ₹50 and ₹75. On a particular Sunday shopkeeper sells 7 toys of type A and 10 toys of type B whereas shopkeeper Q sells 8 toys of type A and 6 toys of type B . Find income of both shopkeepers using matrix Algebra.

15. Suppose 2×3 matrix $A = [a_{ij}]$, whose elements are given by $a_{ij} = \left(\frac{i+2j}{2}\right)$. Construct the matrix A .

16. If $A - 2B = \begin{pmatrix} 1 & 5 \\ 3 & 7 \end{pmatrix}$ and $2A - 3B = \begin{pmatrix} -2 & 5 \\ 0 & 7 \end{pmatrix}$, then find matrix B .

17. Given that $x = -9$ is a root of $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$. Find the other two roots.

18. There are 2 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 allowance for calories is man: 2400, woman: 1900, child: 1800 and for proteins, man: 55 gm, woman: 45 gm and child: 33 gm. Represent the above information by matrices. Using matrix operation, calculate the total requirement of calories and proteins for each of the two families.

19. Express the following matrix as the sum of symmetric and a skew-symmetric matrix:



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

20. A total amount of ₹7000 is deposited in three different savings bank accounts with annual interest rates of 5%, 8% and $8\frac{1}{2}\%$ respectively. The total annual interest from these three accounts is ₹550. Equal amounts have been deposited in 5% and 8% savings accounts. Using matrix method, find the amount deposited in each of these three accounts.
21. The management committee of a Welfare Club decided to award some of its members (say x) for sincerity, some (say y) for helping others selflessly and some others (Say z) for effective management. The sum of all the awardees is 12. Three times the sum of all awardees for helping others selflessly and effectively management added to two times the number of awardees for sincerity is 33. If the sum of the numbers of awardees for sincerity and effective management is twice the number of awardees for helping others, use matrix method to find the number of awardees of each category.

22. **Case Study 1:**

A factory produces three items every day. Their production on certain day is 45 tons. It is found that the production of third item exceeds the production of first item by 8 tons while the total production of first and third item is twice the production of second item.

If x, y and z respectively denote the quantity(in tons) of first, second and third items produced then answer the following questions:

- i) Write the system of linear equations represented by the above situation.
- ii) Write the system of linear equations in matrix form.
- iii) Find the values of x,y and z using cramer's rule

OR

Find the values of x,y and z using Matrix inverse Method.