INDIAN SCHOOL AL WADI AL KABIR
Dept. of Mathematics 2024 – 2025
Class XII – Mathematics
Work Sheet – Determinants 2

1	Using matrices solve the following system of equations: $2x - y + 2z = 3;\ 2x + y + z = -1;\ x - 3y + 2z = 6.$
2	Using matrices solve the following system of equations: $3x - y + z = 5;\ 2x - 2y + 3z = 7;\ x + y - z = -1.$
3	Using matrices solve the following system of equations: $x + 2y + z = 1;\ 2x - y + z = 5;\ 3x + y - z = 0.$
4	Using matrices solve the following system of equations: $x + y + z = 3;\ x - 2y + 3z = 2;\ 2x - y + z = 2.$
5	Show that the matrix $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 5A + 7I = 0$. Hence find A^{-1}.
6	Solve for x, y : $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4;\ \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1;\ \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2.$
7	Using matrix method solve the following system of equations for x, y, z; $\frac{2}{x} - \frac{3}{y} + \frac{3}{z} = 10;\ \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 10;\ \frac{3}{x} - \frac{1}{y} + \frac{2}{z} = 13.$
8	Using determinants, find the area of the triangle whose vertices (–2, 4), (2, –6) and (5, 4). Are the given points collinear?
9	The points (3, –2), (x, 2), (8, 8) are collinear, find x using determinants.
10	If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, find A^2 and show that $A^2 = A^{-1}$
11	If $A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$, verify that $(AB)^{-1} = B^{-1}A^{-1}$.
12	If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, find $\lvert A.(adjA) \rvert$.

13	For what value of x makes the following pairs of determinants equal? $\begin{vmatrix} 2x & 3 \\ 5 & x \end{vmatrix}, \begin{vmatrix} 16 & 3 \\ 5 & 2 \end{vmatrix}$.
14	Write the adjoint of the matrix $\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$.
15	A is a square matrix of order 3 and $\lvert A\rvert = 7$. Write the value of $\lvert \text{adj A} \rvert$.
16	Find the value of x, from the following: $\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$.
17	Write the value of the determinant $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$.
18	If A is an invertible matrix of order 3 and $\lvert A\rvert = 5$ then find $\lvert \text{adj A} \rvert$
19	If $\begin{vmatrix} x+2 & 3 \\ x+5 & 4 \end{vmatrix} = 3$, find the value of x.
20	Find the cofactor of a_{12} in the following: $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$
21	Evaluate: $\begin{vmatrix} \sin 30^\circ & \cos 30^\circ \\ -\sin 60^\circ & \cos 60^\circ \end{vmatrix}$.
22	If $\begin{vmatrix} 2x+5 & 3 \\ 5x+2 & 9 \end{vmatrix} = 0$, find the value of x
23	Evaluate: $\begin{vmatrix} 2\cos\theta & -2\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$.
24	Using matrices, solve the system of equations: $2x - 3y + 5z = 11$ $3x + 2y - 4z = -5$ $x + y - 2z = -3$
25	Using matrices, solve the system of equations: $x - y + z = 6$ $x + 2z = 7$ $3x + y + z = 12$

Answers

1	$x=-1, y=-1, z=2.$
4	$x=1, y=1, z=1.$
7	$x=\frac{1}{2}, y=\frac{1}{3}, z=\frac{1}{5}.$
12	$\lvert A(adj\ A)\rvert = (ad-bc)^2$
15	$\lvert A\rvert^2 = 7^2 = 49$
18	25
21	1
24	$x=1, y=2, z=3$

2	$x=1, y=-1, z=1.$
5	$\frac{1}{7}\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$
8	Area $= \frac{1}{2}\begin{vmatrix} -2 & 4 & 1 \\ 2 & -6 & 1 \\ 5 & 4 & 1 \end{vmatrix} = 35$ sq. cm
13	$x^2 = 16 \Rightarrow x = \pm 4$
16	$x^2 = 4 \Rightarrow x = \pm 2.$
19	$x = 10$
22	$x = -13.$
25	$x=3, y=1, z=2.$

3	$x=1, y=-1, z=2.$
6	$x=2, y=3, z=5.$
9	$\begin{vmatrix} 3 & -2 & 1 \\ x & 2 & 1 \\ 8 & 8 & 1 \end{vmatrix} = 0 \Rightarrow x = 5.$
14	adj A $= \begin{bmatrix} 3 & 1 \\ -4 & 2 \end{bmatrix}$
17	0.
20	46
23	2