

PRASHANT PHYSICS CLASSES

Worksheet - 10

Q1. Solve the following system of equations by matrix method

$$2x + y + z = 1; \quad x - 2y - z = \frac{3}{2} \quad \text{and} \quad 3y - 5z = 9$$

Q2. Solve the following system of equations by matrix method

$$5x + 3y + z = 16; \quad 2x + y + 3z = 19 \quad \text{and} \quad x + 2y + 4z = 25.$$

Q3. Using matrices, solve the following system of equations:

$$x + y + z = 3; \quad x - 2y + 3z = 2 \quad \text{and} \quad 2x - y + z = 2$$

Q4. Using matrices, solve

$$x - y + 2z = 1; \quad 2y - 3z = 1; \quad 3x - 2y + 4z = 2.$$

Q5. Using matrices, solve the following system of equations

$$8x + 4y + 3z = 18; \quad 2x + y + z = 5; \quad x + 2y + z = 5.$$

Q6. Solve the using matrix method

$$3x - 2y + 3z = 8; \quad 2x + y - z = 1; \quad 4x - 3y + 2z = 4.$$

Q7. Using matrices, solve the following system of equations.

$$x + 2y + z = 7; \quad x + 3z = 11; \quad 2x - 3y = 1.$$

Q8. Using matrices, solve the following system of equations.

$$4x + 3y + 2z = 60; \quad x + 2y + 3z = 45; \quad 6x + 2y + 3z = 70.$$

Q9. Using matrices, solve the following system of equations.

$$x - y + 2z = 7; \quad 3x + 4y - 5z = -5 \quad \text{and} \quad 2x - y + 3z = 12$$

Q10. Using matrices, solve the following system of linear equation

$$x + y - z = 3; \quad 2x + 3y + z = 10; \quad 3x - y - 7z = 1$$

Q11. Solve the following system of equations $3x + 2y + z = 6$; $4x - y + 2z = 5$; $7x + 3y - 3z = 7$.

$$\text{If } A = \begin{bmatrix} 3 & 2 & 1 \\ 4 & -1 & 2 \\ 7 & 3 & -3 \end{bmatrix} \text{ find } A^{-1}.$$

Q12. Find A^{-1} and hence solve the following system of equations $8x - 4y + z = 5$, $10x + 6z = 4$,

$$8x + y + 6z = \frac{5}{2}. \text{ If } A = \begin{bmatrix} 8 & -4 & 1 \\ 10 & 0 & 6 \\ 8 & 1 & 6 \end{bmatrix}.$$

Q13. Find A^{-1} and hence solve the following system of equations $3x - 4y + 2z = -1$, $2x + 3y + 5z = 7$

and $x + z = 2$. Where $A = \begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$.

Q14. Find A^{-1} and hence solve the following system of equations $x - 2y + z = 0$, $-y + z = -2$,

$2x - 3z = 10$. Where $A = \begin{bmatrix} 1 & -2 & 1 \\ 0 & -1 & 1 \\ 2 & 0 & -3 \end{bmatrix}$.

Q15. Find A^{-1} using A^{-1} solve the following of equations $2x - y + z = -3$, $3x - z = 0$ and

$2x + 6y - 2 = 0$. Where $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & 0 & -1 \\ 2 & 6 & 0 \end{bmatrix}$.

Q16. Hence solve the system of equations $x + 2y - 3z = -4$, $2x + 3y + 2z = 2$ and $3x - 3y - 4z = 11$.

Find A^{-1} , where $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$.

Q17. Find A^{-1} and hence solve the system of equations $x + 2y + z = 4$, $-x + y + z = 0$ and

$x - 3y + z = 4$. Where $A = \begin{bmatrix} 1 & 2 & 1 \\ -1 & 1 & 1 \\ 1 & -3 & 1 \end{bmatrix}$.

Q18. Find AB , use this to solve the system of equations $x - y = 3$, $2x + 3y + 4z = 17$, $y + 2z = 7$.

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

Q19. Find AB , hence solve system of equations $x - 2y = 10$; $2x + y + 3z = 8$ and $-2y + z = 7$.

Where $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 2 & -6 \\ -2 & 1 & -3 \\ -4 & 2 & 5 \end{bmatrix}$.

Q20. Use the following product to solve the system of equations $x - y + 2z = 1$, $2y - 3z = 1$ and $3x - 2y + 4z = 2$.

$$\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$$

Q21. Use the following product and then use to solve the system of equations $x - y + z = 4$, $x - 2y - 2z = 9$ and $2x + y + 3z = 1$.

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

Q22. Use matrix method to solve the system of equations $x + y = 2$ and $2x + 2y = 4$.

Q23. Examine the consistency of the following system of equations:

$$3x - y + 7z = 3; \quad 2x + y + 3z = 5; \quad x + 4y - 2z = 1.$$

Q24. Show that the following system of equation is consistent: $x - y + z = 3$; $2x + y - z = 2$; $-x - 2y + 2z = 1$. Also, find the solution.

Q25. Using matrices, solve the following system of equations:

$$x + y + z = 6; \quad x + 2y + 3z = 14; \quad x + 4y + 7z = 30.$$

Answers to Worksheet - 10

1. $x = 1, y = 1/2, z = -3/2$ 2. $x = 1, y = 2, z = 5$ 3. $x = 1, y = 1, z = 1$ 4. $x = 0, y = 5, z = 3$
5. $x = 1, y = 1, z = 2$ 6. $x = 1, y = 2, z = 3$ 7. $x = 2, y = 1, z = 3$ 8. $x = 5, y = 8, z = 8$
9. $x = 2, y = 1, z = 3$ 10. $x = 3, y = 1, z = 1$ 11. $x = 1, y = 1, z = 1$ 12. $x = 1, y = 1/2, z = -1$
13. $x = 3, y = 2, z = -1$ 14. $x = 2, y = 0, z = -2$ 15. $x = -1/2, y = 1/2, z = -3/2$
16. $x = 3, y = -2, z = 1$ 17. $x = 2, y = 0, z = 2$ 18. $x = 2, y = -1, z = 4$

19. $\begin{bmatrix} 11 & 0 & 0 \\ 0 & 11 & 0 \\ 0 & 0 & 11 \end{bmatrix}$, $x = 4, y = -3, z = 1$ 20. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, $x = 0, y = 5, z = 3$ 21. $x = 3, y = -2,$

$z = -1$ 22. $x = t$ and $y = 2 - t$ 23. Inconsistent i.e. no solution 24. $x = 5/3, y = t, z = 4/3 + t$

25. $x = -2 + k, y = 8 - 2k$ and $z = k \quad \forall k \in \mathbb{R}$