



= Year 12 mm

= Matrices

= Worksheet 2

1. Use inverse matrix method to solve the simultaneous equations.
 $3a - 2b + c - d = -5$
 $-a + c - 2d = -1$
 $5a - 4b + d = -4$
 $a - b + 3c - 2d = -2$

2. Find a, b, c, d and e such that

$$\begin{bmatrix} a & 0 & c & 0 & b \\ 1 & b & 0 & d & e \\ -1 & 0 & a & -c & -e \\ b & 0 & e & c & -d \\ 0 & 1 & 1 & d & b \end{bmatrix} \begin{bmatrix} -1 \\ 1 \\ 1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 3 \\ -5 \\ 5 \end{bmatrix}$$

3. Find a value for each of x, y and z such that the simultaneous equations are satisfied.
 $0.2x + y - z = 0.4$
 $-2x + y + 3z = 0$
 $-x + 5y - 5z = 2$

4. Consider $\begin{bmatrix} -3 & a \\ 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ b \end{bmatrix}$. Find a and b such that (i) no x and y values, and (ii) infinite number of x and y values, will satisfy the matrix equation.

5. Consider the simultaneous equations $(m-1)x + 5y = 10$ and $3x + (m-3)y = m$. Find the values of m such that the equations (i) have infinitely many solutions, and (ii) have no solutions.

6. Consider
 $-2x - 2y + 4z = 6$
 $x + ay + 5z = 1$
 $bx + y - 2z = -3$
 Find the values of a and b such that the simultaneous equations have infinitely many solutions.

7. For the matrix equation $\begin{bmatrix} 1 & -p-1 \\ p+2 & -6 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = -2 \begin{bmatrix} 1 \\ 3p \end{bmatrix}$, find p such that the equation (i) has infinitely many solutions, (ii) has no solutions and (iii) has a unique solution for each of x and y .

8. Find a, b and c such that the matrix equation

$$\begin{bmatrix} a & 1 & 1 \\ 2 & b & 5 \\ -1 & 2 & c \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ -1 \\ 4 \end{bmatrix}$$
 has a unique solution for each of x, y and z .

Numerical, algebraic and worded answers.

1. $a = -2, b = -1, c = 1, d = 2$	4. (i) $a = -3/2, b \neq -10/3$ (ii) $a = -3/2, b = -10/3$	7. (i) $p = 1$ (ii) $p = -4$ (iii) $p \in \mathbb{R} \setminus \{-4, 1\}$
2. $a = -1, b = 1, c = -1, d = 1, e = -1$	5. (i) $m = 6$ (ii) $m = -2$	8. $a, b, c \in \mathbb{R}$
3. $x = 2/9, y = 4/9, z = 0$, or other values	6. $a \in \mathbb{R}, b = 1$	