1.

Let $A = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 0 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 18 \\ 23 \\ 13 \end{pmatrix}$ and $X = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$.

Consider the equation $AX = B$.

(i)   Express X in terms of A^{-1} and B.

(ii)   **Hence**, solve for X.

2. Consider the simultaneous equations

$$x + 2y = 7$$
$$-3x + y - z = 10$$
$$2x - 2y + z = -12$$

(a)   Write these equations as a matrix equation.

(b)   Solve the matrix equation.

3. Consider the simultaneous equations

$$x - 3y = 1$$
$$2x + z = 2$$
$$4x + y + 3z = -1$$

(a)   Write these equations as a matrix equation.

(b)   Solve the matrix equation.

4. Let $M = \begin{pmatrix} 2 & 1 \\ 2 & -1 \end{pmatrix}$.

solve $M\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$.

5.

Let $A = \begin{pmatrix} 5 & 1 \\ 6 & 2 \end{pmatrix}$, $X = \begin{pmatrix} x \\ y \end{pmatrix}$ and $C = \begin{pmatrix} 8 \\ -4 \end{pmatrix}$. Solve the matrix equation $AX = C$.

6. A matrix M has **inverse** $M^{-1} = \begin{pmatrix} 5 & 0 \\ 1 & 2 \end{pmatrix}$.

Solve the matrix equation $MX = B$, where $B = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$ and $X = \begin{pmatrix} x \\ y \end{pmatrix}$.

7. Let $A = \begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} -5 \\ 5 \end{pmatrix}$.

Solve $A^{-1}X = B$.

8. Let $A = \begin{pmatrix} 2 & -4 \\ -1 & 3 \end{pmatrix}$.

Solve the matrix equation $AX = \begin{pmatrix} 4 & 6 \\ 2 & -2 \end{pmatrix}$.

9. Let A, B, C and X be square matrices, such that $XA + B = C$.

(a) Find an expression for X in terms of A, B and C.

(b) Given that $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 1 \\ 1 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 3 \\ -3 & 4 \end{pmatrix}$, find X.

10.

Let $A = \begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & 1 \\ -1 & 1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 \\ -1 \\ 3 \end{pmatrix}$ Solve $AX = B$.

11. Let $A = \begin{pmatrix} 0 & 5 & 4 \\ 1 & 2 & 1 \\ 2 & 2 & 0 \end{pmatrix}$, and $B = \begin{pmatrix} 11 \\ 7 \\ 10 \end{pmatrix}$. Solve $AX = B$.

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1.

Let $A = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 0 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 18 \\ 23 \\ 13 \end{pmatrix}$ and $X = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$.

Consider the equation $AX = B$.

(i)   Express X in terms of A^{-1} and B.

(ii)   **Hence**, solve for X.

2. Consider the simultaneous equations

$$x + 2y = 7$$
$$-3x + y - z = 10$$
$$2x - 2y + z = -12$$

(a)   Write these equations as a matrix equation. $\begin{pmatrix} 1 & 2 & 0 \\ -3 & 1 & -1 \\ 2 & -2 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 7 \\ 10 \\ -12 \end{pmatrix}$

(b)   Solve the matrix equation. $x = 4, y = 1, z = -6$

3. Consider the simultaneous equations

$$x - 3y = 1$$
$$2x + z = 2$$
$$4x + y + 3z = -1$$

(a)   Write these equations as a matrix equation. $\begin{pmatrix} 1 & -3 & 0 \\ 2 & 0 & 1 \\ 4 & 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$

(b)   Solve the matrix equation. $x = 4, y = 1, z = -6$

4. Let $M = \begin{pmatrix} 2 & 1 \\ 2 & -1 \end{pmatrix}$.

solve $M \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$. $x = 3, y = -2$

5. Let $A = \begin{pmatrix} 5 & 1 \\ 6 & 2 \end{pmatrix}$, $X = \begin{pmatrix} x \\ y \end{pmatrix}$ and $C = \begin{pmatrix} 8 \\ -4 \end{pmatrix}$. Solve the matrix equation $AX = C$. $x = 5, y = -17$

6. A matrix M has **inverse** $M^{-1} = \begin{pmatrix} 5 & 0 \\ 1 & 2 \end{pmatrix}$.

Solve the matrix equation $MX = B$, where $B = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$ and $X = \begin{pmatrix} x \\ y \end{pmatrix}$. $\quad x = 5, y = 15$

7. Let $A = \begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} -5 \\ 5 \end{pmatrix}$.

Solve $A^{-1}X = B$. $\quad \begin{pmatrix} -15 \\ 5 \end{pmatrix}$

8. Let $A = \begin{pmatrix} 2 & -4 \\ -1 & 3 \end{pmatrix}$.

Solve the matrix equation $AX = \begin{pmatrix} 4 & 6 \\ 2 & -2 \end{pmatrix}$. $\quad \begin{pmatrix} 10 & 5 \\ 4 & 1 \end{pmatrix}$

9. Let A, B, C and X be square matrices, such that $XA + B = C$.

(a) Find an expression for X in terms of A, B and C. $\quad X = (C - B)A^{-1}$

(b) Given that $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 1 \\ 1 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 3 \\ -3 & 4 \end{pmatrix}$, find X. $\quad \begin{pmatrix} 1 & 0 \\ 11 & -5 \end{pmatrix}$

10. Let $A = \begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & 1 \\ -1 & 1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 \\ -1 \\ 3 \end{pmatrix}$ Solve $AX = B$. $\quad \begin{pmatrix} -4 \\ 4 \\ -5 \end{pmatrix}$

11. Let $A = \begin{pmatrix} 0 & 5 & 4 \\ 1 & 2 & 1 \\ 2 & 2 & 0 \end{pmatrix}$, and $B = \begin{pmatrix} 11 \\ 7 \\ 10 \end{pmatrix}$. Solve $AX = B$.