

Question1) Find the solution of each of the following linear equations.

- a) $7x - 5y = 3$
- b) $3v - 8w + 2x - y + 4z = 0$
- c) $3x_1 - 5x_2 + 4x_3 = 7$
- d) $-8x_1 + 2x_2 - 5x_3 + 6x_4 = 1$

Question2) Find the augmented matrix for each of the following systems of linear equations.

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|---|---|
| $3x_1 - 2x_2 = -1$ <p>a) $4x_1 + 5x_2 = 3$</p> $7x_1 + 3x_2 = 2$ | $x_1 + 2x_2 - x_4 + x_5 = 1$ $3x_2 + x_3 - x_5 = 2$ $7x_3 + 7x_4 = 1$ |
|---|---|

Question3) Find a system of linear equations corresponding to the augmented matrix.

| | |
|---|--|
| <p>a) $\begin{bmatrix} 2 & 0 & 0 \\ 3 & -4 & 0 \\ 0 & 1 & 1 \end{bmatrix}$</p> | <p>b) $\begin{bmatrix} 1 & 0 & 0 & 0 & 7 \\ 0 & 1 & 0 & 0 & -2 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 4 \end{bmatrix}$</p> |
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Question4) For which values(s) of the constant k does the following system of linear equations have no solutions? Exactly one solution? Infinitely many solutions?

$$x - y = 3$$

$$2x - 2y = k$$

Question5) Consider the system of equations

$$x + y + 2z = a$$

$$x + z = b$$

$$2x + y + 3z = c$$

Show that in order for this system to be consistent a,b, and c must satisfy $c = a + b$

Question6) In each part, determine whether the matrix is in row echelon form (REF), reduced row echelon form (RREF), both or neither.

$$\begin{array}{l}
 \text{a) } \begin{bmatrix} 1 & 2 & 0 & 3 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} \quad
 \text{b) } \begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 0 & 1 & 3 \\ 0 & 1 & 0 & 4 \end{bmatrix} \quad
 \text{c) } \begin{bmatrix} 1 & -7 & 5 & 5 \\ 0 & 1 & 3 & 2 \end{bmatrix} \quad
 \text{d) } \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}
 \end{array}$$

Question7) In each part, suppose that the augmented matrix for a system of linear equations has been reduced by row operations to the given REF. Solve the system.

$$\begin{array}{l}
 \text{a) } \begin{bmatrix} 1 & 0 & 8 & -5 & 6 \\ 0 & 1 & 4 & -9 & 3 \\ 0 & 0 & 1 & 1 & 2 \end{bmatrix} \quad
 \text{b) } \begin{bmatrix} 1 & 7 & -2 & 0 & -8 & -3 \\ 0 & 0 & 1 & 1 & 6 & 5 \\ 0 & 0 & 0 & 1 & 3 & 9 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}
 \end{array}$$

Question8) Solve each of the following systems by Gauss Elimination and Gauss-Jordan Elimination.

$$\begin{array}{l}
 \begin{array}{l} 2x_1 + 2x_2 + 2x_3 = 0 \\ -2x_1 + 5x_2 + 2x_3 = 1 \\ 8x_1 + x_2 + 4x_3 = -1 \end{array} \quad
 \begin{array}{l} x - y + 2z - w = -1 \\ 2x + y - 2z - 2w = -2 \\ -x + 2y - 4z + w = 1 \\ 3x \qquad \qquad -3w = -3 \end{array} \quad
 \begin{array}{l} 4x_1 - 8x_2 = 12 \\ 3x_1 - 6x_2 = 9 \\ -2x_1 + 4x_2 = -6 \end{array} \quad
 \begin{array}{l} 5x_1 - 2x_2 + 6x_3 = 0 \\ -2x_1 + x_2 + 3x_3 = 1 \end{array}
 \end{array}$$

Question9) Solve the following homogeneous systems of linear equations by any method.

$$\begin{array}{l}
 \begin{array}{l} 2x - y - 3z = 0 \\ -x + 2y - 3z = 0 \\ x + y + 4z = 0 \end{array} \quad
 \begin{array}{l} 2x_1 + x_2 + 3x_3 = 0 \\ x_1 + 2x_2 = 1 \\ x_2 + x_3 = -1 \end{array} \quad
 \begin{array}{l} 3x_1 + x_2 + x_3 + x_4 = 0 \\ 5x_1 - x_2 + x_3 - x_4 = 0 \end{array}
 \end{array}$$

Question10) Solve the following system where a,b, and c are constant.

$$\begin{array}{l}
 2x + y = a \\
 3x + 6y = b
 \end{array}$$