

Key Problems

Problem 1.

Solve the systems of equations:

$$\begin{array}{llll} \text{a) } 2x + 3y = 14 & \text{b) } x^2 + y^2 = 20 & \text{c) } x - 2y = 6 & \text{d) } x^2 - y^2 = 8 \\ 7x - 4y = 20 & x - y = 2 & xy = -4 & xy = 3 \end{array}$$

Problem 2.

Solve the equation $ax = b$ when

$$\text{a) } a = b = 1 \qquad \text{b) } a = 1, b = 0 \qquad \text{c) } a = 0, b = 1 \qquad \text{d) } a = b = 0$$

Problem 3.

Solve the systems of equations:

$$\begin{array}{ll} \text{a) } \begin{array}{l} x + y + z = 4 \\ x + 2y + 4z = 9 \\ x + 3y + 9z = 16 \end{array} & \text{b) } \begin{array}{l} x - y + z = 3 \\ 2x - 4y + z = 1 \\ 3x - 5y + 2z = 4 \end{array} \end{array}$$

Problem 4.

Use Gaussian elimination to solve the linear systems:

$$\begin{array}{ll} \text{a) } \begin{array}{l} x + y + z = 11 \\ x + 2y + 4z = 22 \\ x - y + z = 1 \end{array} & \text{b) } \begin{array}{l} x + y + z = 6 \\ x + 2y + 4z = 16 \\ x + 3y + 9z = 20 \end{array} \end{array}$$

Problem 5.

Use Gaussian elimination to solve the linear systems. How many solutions are there?

$$\begin{array}{lll} \text{a) } \begin{array}{l} x + 3y = 1 \\ x - y = 9 \\ 2x + 2y = 3 \end{array} & \text{b) } \begin{array}{l} x + 3y = 7 \\ x - y = 3 \\ 2x + 2y = 10 \end{array} & \text{c) } \begin{array}{l} x + y + z = 11 \\ x - y + z = 9 \\ 2x + 3y + 5z = 44 \\ 3x - y + 2z = 45 \end{array} \end{array}$$

Problem 6.

Use Gaussian elimination to solve the linear systems. How many solutions are there?

$$\begin{array}{ll} \text{a) } \begin{array}{l} x + 2y + 3z = 4 \\ -x - y + z = 1 \\ 3x + 4y + z = 2 \end{array} & \text{b) } \begin{array}{l} 3x + 4y + 3z = 2 \\ 2x - y + z = 1 \\ 7x + 2y + 5z = 3 \end{array} \end{array}$$

