Multivariable Linear Systems

Section 7.3

Solve the system of equations which is in row-echelon form.

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

$$y + z = 3 \qquad y + 2 = 3$$

$$z = 2$$

$y = 1$

$x - 1 + 2(2) = 1$

$x + 3 = 1$

$x = -2 \qquad (-2, 1, 2)$

Solve by Gaussian Elimination

$$\begin{cases} x - 3y + 2z = 1 \\ 2x - 5y + z = -5 \\ 3x + y - 2z = -1 \end{cases}$$

-3, (-2), $+$

$-3x + 9y - 6z = -3$

$-2x + 6y - 4z = -2$

$-10\,(y - 3z = -7)$

$10y - 8z = -4$

$-10y + 30z = +70$

$22z = 66$

$z = 3$

$x - 3(2) + 2(3) = 1$

$x = 1$

$(1, 2, 3)$

$y - 3(3) = -7$

$+9 \quad +9$

$y = 2$

Solve by Gaussian Elimination

$$\begin{matrix} A \\ B \\ C \end{matrix} \begin{cases} x + y + z = 2 \\ 2x + 3y + 4z = 5 \\ x - z = 1 \end{cases}$$

$A(-2)+B$

$$\begin{array}{r} -2x - 2y - 2z = -4 \\ 2x + 3y + 4z = 5 \\ \hline y + 2z = 1 \end{array}$$

$A(-1)+C$

$$\begin{array}{r} -x - y - z = -2 \\ + \quad x \quad\quad - z = 1 \\ \hline -y - 2z = -1 \end{array}$$

$$0 + 0 = 0$$

inf. # solns.

Solve a Non-Square System by Gaussian Elimination

$$\begin{cases} x - 4y + 2z = 5 \\ 3x + 5y - 2z = 1 \end{cases}$$

$+$

$4x + y = 6$

$y = -4x + 6$

$3x + 5(-4x + 6) - 2z = 1$

$3x + -20x + 30 - 2z = 1$

$-17x - 2z = -29$

$$\begin{bmatrix} -2(x - 2y + z = 2) \\ 2x - y - z = 1 \\ -2x + 4y - 2z = -4 \end{bmatrix}$$

$3y - 3z = -3$

$y - z = -1$

$y = z - 1$

$y = a - 1$

$(-a, a-1, a)$

$z = a$

$x - 2(a-1) + a = 2$

$x - 2a + 2 + a = 2$

$x + a = 0$

$x = -a$

Find the equation of the parabola $y = ax^2 + bx + c$ that passes through (1,6), (-1, 4), and (2, 13).

$y = ax^2 + bx + c$

$6 = a(1)^2 + b(1) + c$

$4 = -1^2 a + -1(b) + c$

$13 = a(2)^2 + b(2) + c$

$a + b + c = 6$

$a - b + c = 4$

$4a + 2b + c = 13$

$-1(A) + B$: $-a - b - c = -6$

$-2b = -2$

$b = 1$

$-4(A) + C$: $-4a - 4b - 4c = -24$

$-2b - 3c = -11$

$-2 - 3c = -11$

$-3c = -9$

$c = 3$

$a + 1 + 3 = 6$

$a + 4 = 6$

$a = 2$

$y = 2x^2 + x + 3$

7.3 pg. 496 13-21 odd, 33, 51, 53, 59, 61