Edward Mejia
09-18-2012
Assignment #2

1-23 odd

Problems 1 & 3
Solve equation using elementary row operations on the equations or the augmented matrix. Follow systematic elimination procedure.

1.
$x_1 + 5x_2 = 7$

$-2x_1 - 7x_2 = -5$

$$\begin{bmatrix} 1 & 5 & 7 \\ -2 & -7 & 5 \end{bmatrix}$$

{Step 1}
$2(R_1) + R_2 = R_2$

$$\begin{bmatrix} 1 & 5 & 7 \\ 0 & 3 & 9 \end{bmatrix}$$

{Step 2}
$1/3(R_2)$

$$\begin{bmatrix} 1 & 5 & 7 \\ 0 & 1 & 3 \end{bmatrix}$$

$X_2 = 3$

{Step3}
Substitute back in to get your x_1 value.

$X_1 + 5(3) = 7$
$X1 + 15 = 7$
$-15 \quad -15$
$X_1 = -8$

Answer: $(x_1, x_2) = (-8, 3)$

3.
$X_1 + 2x_2 = 4$
$X_1 - x_2 = 1$

$$\begin{bmatrix} 1 & 2 & 4 \\ 1 & -1 & 1 \end{bmatrix}$$

{Step 1}
$-1(R_1) + R_2 = R_2$

$$\begin{bmatrix} 1 & 2 & 4 \\ 0 & 3 & 3 \end{bmatrix}$$

{Step 2}
$1/3(R_2)$

$$\begin{bmatrix} 1 & 5 & 7 \\ 0 & 1 & 1 \end{bmatrix}$$

$X_2 = 1$

{Step3}
Substitute x_2 back in to get your x_1 value.

$X_1 + 2(1) = 4$
$X_1 + 2 = 4$
$-2 \quad -2$
$X_1 = 2$

Answer: $(x_1, x_2) = (2,1)$

- Be careful with calculations :D!

5.
State in words the next two elementary row operations.

$$\begin{bmatrix} 1 & -4 & -3 & 0 & 7 \\ 0 & 1 & 4 & 0 & 6 \\ 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 1 & -5 \end{bmatrix}$$

Step 1
Multiply R_2 by -4 and add R_3 which then equals your new R_2, then
Multiply R_3 by 3 and add R_1 and your result will be R_1.

Problems 7 & 9 have been augmented and reduced to row operations. In each case continue the appropriate row operations and describe solution set.

7.

$$\begin{bmatrix} 1 & 7 & 3 & -4 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

There is no solution because in R_3 x_1, x_2, x_3 carry a zero value and $0 \neq 1$.

9.

$$\begin{bmatrix} 1 & -1 & 0 & 0 & -5 \\ 0 & 1 & -2 & 0 & -7 \\ 0 & 0 & 1 & -3 & 2 \\ 0 & 0 & 0 & 1 & 4 \end{bmatrix}$$

X_4 is given.

$X_4 = 4$

Step 1 Substitute x_4 in R_3 which will give you x_3.

$X_3 = 14$

Step 2 Substitute x_3 in R_2 which will give you x_2.

$X_2 = 21$

Step 3 Substitute x_2 in R_1 which will give you x_1.

$X_1 = 16$

Solve the systems in Exercises 11–14.

11.

$$\begin{aligned} x_2 + 5x_3 &= -4 \\ x_1 + 4x_2 + 3x_3 &= -2 \\ 2x_1 + 7x_2 + x_3 &= -2 \end{aligned}$$

Answer: Inconsistent

13.
$$\begin{aligned} x_1 - 3x_3 &= 8 \\ 2x_1 + 2x_2 + 9x_3 &= 7 \\ x_2 + 5x_3 &= -2 \end{aligned}$$

$$\begin{bmatrix} 1 & 0 & -3 & 8 \\ 2 & 2 & 9 & 7 \\ 0 & 1 & 5 & -2 \end{bmatrix}$$

{Step 1}
$-2(R_1) + R_2 = R_2$

$$\begin{bmatrix} 1 & 0 & -3 & 8 \\ 0 & 2 & 15 & -9 \\ 0 & 1 & 5 & -2 \end{bmatrix}$$

{Step 2}
$-2(R_3) + R_2 = R_2$

$$\begin{bmatrix} 1 & 0 & -3 & 8 \\ 0 & 0 & 5 & -5 \\ 0 & 1 & 5 & -2 \end{bmatrix}$$

{Step3}
Interchange R_2 with R_3.

$$\begin{bmatrix} 1 & 0 & -3 & 8 \\ 0 & 1 & 5 & -2 \\ 0 & 0 & 5 & -5 \end{bmatrix}$$

{Step4}
$1/5(R_3) = R_3$

$$\begin{bmatrix} 1 & 0 & -3 & 8 \\ 0 & 1 & 5 & -2 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

$X_3 = -1$

{Step 4}
Substitute back in to get your x_2,x_1, values.

$X_2 = 3$
$X_1 = 5$

Determine if the systems in Exercises 15 and 16 are consistent. Do not completely solve the systems.

15.
$$\begin{aligned} x_1 - 6x_2 &= 5 \\ x_2 - 4x_3 + x_4 &= 0 \\ -x_1 + 6x_2 + x_3 + 5x_4 &= 3 \\ -x_2 + 5x_3 + 4x_4 &= 0 \end{aligned}$$

Inconsistent there is no solution.

17. Do the three lines $2x_1 + 3x_2 = -1$, $6x_1 + 5x_2 = 0$, and $2x_1 - 5x_2 = 7$ have a common point of intersection? Explain.

Inconsistent

In Exercises 19–22, determine the value(s) of h such that the matrix is the augmented matrix of a consistent linear system.

19. $\begin{bmatrix} 1 & h & 4 \\ 3 & 6 & 8 \end{bmatrix}$

Answer: h≠2

21. $\begin{bmatrix} 1 & 4 & -2 \\ 3 & h & -6 \end{bmatrix}$

All h.

For Questions 19 & 21 did not have a clue.