MATH 320, Spring 2013, Assignment 5

Textbook Questions

Section 3.1, #21 Use the method of elimination to determine whether the given linear system is consistent or inconsistent. For each consistent system, find the solution if it is unique; otherwise, describe the infinite solution set in terms of an arbitrary parameter t.

$$\begin{aligned} x + y - z &= 5 \\ 3x + y + 3z &= 11 \\ 4x + y + 5z &= 14. \end{aligned}$$

Section 3.2 Use elementary row operations to transform each augmented coefficient matrix to echeon form. Then solve the system by back substitution.

#12

$$\begin{aligned} 3x_1 + x_2 - 3x_2 &= 6 \\ 2x_1 + 7x_2 + x_2 &= -9 \\ 2x_1 + 5x_2 \qquad &= -5 \end{aligned}$$

#15

$$\begin{aligned} 3x_1 + x_2 - 3x_3 &= -4 \\ x_1 + \ x_2 + \ x_3 &= 1 \\ 5x_1 + 6x_2 + 8x_3 &= 8 \end{aligned}$$

#20

$$\begin{aligned} 2x_1 + 4x_2 - x_3 - 2x_4 + 2x_5 &= 6 \\ x_1 + 3x_2 + 2x_3 - 7x_4 + 3x_5 &= 9 \\ 5x_1 + 8x_2 - 7x_3 + 6x_4 + x_5 &= 4 \end{aligned}$$

Section 3.2, # 27 Determine for what values of k the following system has (a) a unique solution; (b) no solution; (c) infinitely many solutions.

$$\begin{aligned} x + 2y + z &= 3 \\ 2x - y - 3z &= 5 \\ 4x + 3y - z &= k \end{aligned}$$

Section 3.3, # 17 Find the reduced echelon form of the following matrix:

$$\begin{bmatrix} 1 & 1 & 1 & -1 & -4 \\ 1 & -2 & -2 & 8 & -1 \\ 2 & 3 & -1 & 3 & 11 \end{bmatrix}$$

Section 3.3, # 35 Consider the homogeneous system

$$\begin{aligned} ax + by &= 0 \\ cx + dy &= 0. \end{aligned}$$

1. If $x = x_0$ and $y = y_0$ is a solution and k is a real number, then show that $x = kx_0$ and $y = ky_0$ is also a solution.
2. If $x = x_1$, $y = y_1$ and $x = x_2$, $y = y_2$ are both solutions, then show that $x = x_1 + x_2$, $y = y_1 + y_2$ is a solution.