Math 310 Homework 1 Solutions

Chapter 1, Section 1

1a. $x_1 = 11$, $x_2 = 3$

1c. $x_1 = -2$, $x_2 = 0$, $x_3 = 3$, $x_4 = 1$

3a. one intersection $\Rightarrow$ one solution

3c. these are the same line so there are infinite intersections $\Rightarrow$ infinite solutions

6a. $x_1 = 1$, $x_2 = -2$

6d. $x_1 = 1$, $x_2 = 1$, $x_3 = 2$

6f. $x_1 = -1$, $x_2 = 1$, $x_3 = 1$

Chapter 1, Section 2

1. Row echelon form: (a), (c), (d), (g), (h); Reduced row echelon form: (c), (d), (g)

2a. inconsistent

2c. consistent; has infinite solutions

5a. Row echelon form of $(A|\mathbf{b})$:

$$\left[\begin{array}{cc|c} 1 & -2 & 3 \\ 0 & 1 & 1 \end{array}\right]$$

Solution: $x_1 = 5$, $x_2 = 1$

5c. Row echelon form of $(A|\mathbf{b})$:

$$\left[\begin{array}{cc|c} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{array}\right]$$

Solution: $x_1 = 0$, $x_2 = 0$

5k. Row echelon form of $(A|\mathbf{b})$:

$$\left[\begin{array}{cccc|c} 1 & 3 & 1 & 1 & 3 \\ 0 & 1 & \frac{1}{8} & 0 & -\frac{1}{4} \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

Solution: $x_1 = \frac{15}{4} - \frac{5}{8}\alpha - \beta$, $x_2 = -\frac{1}{4} - \frac{1}{8}\alpha$, $x_3 = \alpha$, $x_4 = \beta$ where $\alpha, \beta \in \mathbb{R}$