MA 322

Assignment 1

1. Suppose the system
$$\begin{aligned} 2x_1 + x_2 &= f \\ cx_1 + dx_2 &= g \end{aligned}$$
has a solution for all possible values of f and g. What can you say about c and d?

2. Find three different systems of linear equations whose solutions are $x_1 = 3, x_2 = 0, x_3 = -1$.

3. Choose h and k so that the system
$$\begin{aligned} x_1 + 3x_2 &= 2 \\ 3x_1 + hx_2 &= k \end{aligned}$$
   (a) has no solution,
   (b) has one solution,
   (c) has infinitely many solutions.

4. In the following matrices ■ is a nonzero entry and $*$ is a entry that may or may not be zero. For each of these (augmented) matrices determine if the associated system has a solution, and if it does, determine if the solution is unique.
   (a) $\begin{bmatrix} ■ & * \\ 0 & 0 \end{bmatrix}$
   (b) $\begin{bmatrix} ■ & * \\ 0 & ■ \end{bmatrix}$
   (c) $\begin{bmatrix} ■ & * & * \\ 0 & ■ & * \end{bmatrix}$
   (d) $\begin{bmatrix} 0 & ■ & * & * \\ 0 & 0 & 0 & ■ \end{bmatrix}$
   (e) $\begin{bmatrix} ■ & * & * & * \\ 0 & 0 & ■ & * \\ 0 & 0 & 0 & 0 \end{bmatrix}$