Math 1553 Worksheet §1.2, §1.3

1. Is it possible for a linear system to have a unique solution if it has more equations than variables? If yes, give an example. If no, justify why it is impossible.

2.   **a)** Which of the following matrices are in row echelon form? Which are in reduced row echelon form?

      b) For the matrices in row echelon form, which entries are the pivots? What are the pivot columns?

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

3. Find the parametric form for the solution set of the following system of linear equations in x_1, x_2, and x_3 by putting an augmented matrix into reduced row echelon form. State which variables (if any) are free variables. Describe the solution set geometrically.

$$\begin{aligned} x_1 + 3x_2 + x_3 &= 1 \\ -4x_1 - 9x_2 + 2x_3 &= -1 \\ -3x_2 - 6x_3 &= -3. \end{aligned}$$