Math 1553 Worksheet §2.3, S2.4

- **1.** True or false. If the statement is *always* true, answer True. Otherwise, answer False. In parts (a) and (b), *A* is an $m \times n$ matrix and *b* is a vector in \mathbb{R}^m .
 - a) If b is in the span of the columns of A, then the matrix equation Ax = b is consistent.

b) If Ax = b is inconsistent, then *A* does not have a pivot in every column.

c) If A is a 4×3 matrix, then the equation Ax = b is inconsistent for some b in \mathbf{R}^4 .

d) Suppose *A* is a 3×3 matrix with two pivots, and suppose that *b* is a vector so that Ax = b is consistent. Then the solution set for Ax = b is a plane.

2. Let

$$A = \begin{pmatrix} 1 & 0 & 5 \\ -2 & 1 & -6 \\ 0 & 2 & 8 \end{pmatrix}, \qquad b = \begin{pmatrix} 2 \\ -1 \\ 6 \end{pmatrix}.$$

Solve the matrix equation Ax = b and write your answer in parametric form.

3. Find the set of solutions to $x_1 - 3x_2 + 5x_3 = 0$ and write your answer in parametric vector form. Next, find the set of solutions to $x_1 - 3x_2 + 5x_3 = 3$ and write the solutions in parametric vector form. How do the solution sets compare geometrically?

- **4.** Let $A = \begin{pmatrix} 1 & -1 \\ 4 & -4 \end{pmatrix}$. On the same graph, draw each of the following: (a) The span of the columns of *A*.
 - (b) The set of solutions to $Ax = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$.
 - (c) The set of solutions to $Ax = \begin{pmatrix} 2 \\ 8 \end{pmatrix}$. Label each of these clearly.

