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 $\mathbf{R}^m$.

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 $\mathbb{R}^4$.

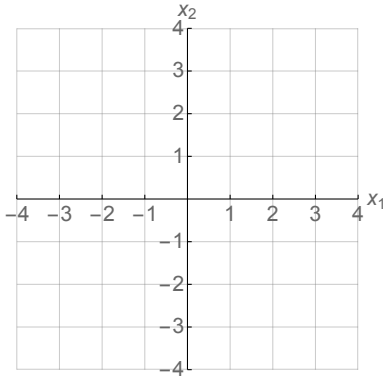
2. Let

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

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

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

4. Let $A = \begin{pmatrix} 1 & -1 \\ 4 & -4 \end{pmatrix}$. Draw the span of the columns of A, and draw the set of solutions to $Ax = 0$. Clearly label each.



5. Write an augmented matrix corresponding to a system of two linear equations in the three variables x_1, x_2, x_3, so that the solution set is the span of $\begin{pmatrix} -4 \\ 1 \\ 0 \end{pmatrix}$.