Math 1553 Worksheet §§2.4, 2.5

1. 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?

2. If the statement is always true, circle TRUE. Otherwise, circle FALSE. Justify your answer.

a) Suppose $A = \begin{pmatrix} v_1 & v_2 & v_3 \end{pmatrix}$ and $A\begin{pmatrix} -3 \\ 2 \\ 7 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$. Then v_1, v_2, v_3 are linearly dependent? If true, write a linear dependence relation for the vectors.
TRUE **FALSE**

b) If $Ax = b$ is consistent, then $Ax = 5b$ is consistent. **TRUE** **FALSE**

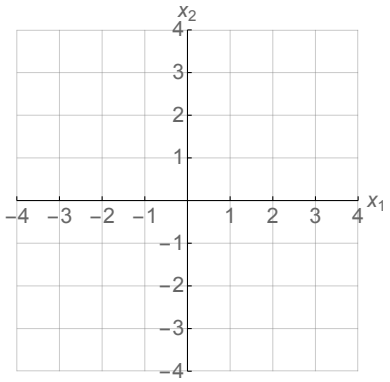
c) In the following, A is an $m \times n$ matrix.

(1) **TRUE** **FALSE** If A has linearly dependent columns, then $m < n$.

(2) **TRUE** **FALSE** If A has linearly independent columns, then $Ax = b$ always have at least one solution for any b in $\mathbf{R}^m$.

(3) **TRUE** **FALSE** If b is a vector in $\mathbf{R}^m$ and $Ax = b$ has a exactly one solution, then $m \geq n$.

3. 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.



4. 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 $\begin{pmatrix} -4 \\ 1 \\ 0 \end{pmatrix}$.