## 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  $4 \times 3$  matrix, then the equation Ax = b is inconsistent for some b in  $\mathbb{R}^4$ .

**d)** Suppose *A* is a  $3 \times 3$  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  $A = \begin{pmatrix} 1 & -1 \\ 4 & -4 \end{pmatrix}$ . 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.



**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.** This is extra practice in case the studio finishes the rest of the worksheet early.

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.