

MTH 261

LINEAR ALGEBRA

SUMMER 2017

Solution Sets to Homogeneous and Nonhomogeneous Linear Systems

Find partners, and follow the instructions. You will not turn this in, but you must be working diligently to get attendance credit.

1. Suppose that the solution set of a system of linear equations can be described as

$$x_1 = 4 + 5x_3$$

$$x_2 = -4 - 6x_3$$

x_3 is free

The solution set is a line in $\mathbb{R}^3$ passing through the point _____ and parallel to the vector _____.

2. Find all solutions to the system and write them in *parametric* form.

$$2x_1 - 3x_2 - 4x_3 = 4$$

$$-2x_1 + 3x_2 + 4x_3 = -4$$

$$5x_2 + 5x_3 = 7$$

Once you have done the above:

The solution set is a line in $\mathbb{R}^3$ passing through the point _____ and parallel to the vector _____. Try to sketch the solution set.

3. *Using work you already did in problem 2*, find all solutions to the system below in parametric form.

$$2x_1 - 3x_2 - 4x_3 = 0$$

$$-2x_1 + 3x_2 + 4x_3 = 0$$

$$5x_2 + 5x_3 = 0$$

4. Find a parametric equation of the line through $\begin{bmatrix} 1 \\ 5 \end{bmatrix}$ parallel to $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$.

5. Describe all solutions to $A\vec{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 0 \end{bmatrix}$ in parametric form, where

$$A = \begin{bmatrix} 1 & -4 & -2 & 0 & 3 & -5 \\ 0 & 0 & 1 & 0 & 0 & -1 \\ 0 & 0 & 0 & 0 & 1 & -4 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$