

Activity 6: Vector Spaces Again

Names: _____ Date: October 22, 2009 Score: _____

Show your work for each of the following. You should submit one copy for your group. Feel free to ask your instructor for advice if you need it.

1. (71 pts) Consider the equations

$$x_1 + 3x_2 + 8x_3 + 3 - x_4 = 0$$

$$x_1 - 3x_2 - 10x_3 + 5x_5 = 0$$

$$x_1 + 4x_2 + 11x_3 - 2x_4 = 0$$

- (a) Find a basis for the solutions space to this system of equations.
- (b) Write a general formula for all solutions to the system of equations.
2. (1 pt each) Which of the following sets are subspaces of \mathbb{R}^4 ?
- (a) The set of points in \mathbb{R}^4 such that $x_1 - 2x_2 + 3x_3 - 4x_4 = 5$.
- (b) The set of points in \mathbb{R}^4 such that $x_1 - 2x_2 + 3x_3 - 4x_4 = 0$.
- (c) The set of points in \mathbb{R}^4 such that $x_1 = 2x_2$ and $3x_3 = 4x_4$.
- (d) The set of points in \mathbb{R}^4 such that $|x_1| = 2|x_2|$ and $3x_3 = 4x_4$.
- (e) The set of points in \mathbb{R}^4 such that $|x_1| + 2|x_2| = 0$ and $3x_3 = 4x_4$.
- (f) The set of points in \mathbb{R}^4 such that $x_1 - 2x_2 = 3x_3 + 4x_4$.

3. (7 pts) Consider the equations

$$\begin{aligned}x_1 + 3x_2 + 8x_3 - x_4 &= 1 \\x_1 - 3x_2 - 10x_3 + 5x_5 &= 1 \\x_1 + 4x_2 + 11x_3 - 2x_4 &= 1\end{aligned}$$

- (a) Is the set of solutions to this system of equations a subspace of \mathbb{R}^n ?
- (b) Write a general form for all solutions to this equation.