Last name _____

First name _____

LARSON—MATH 310–HOMEWORK WORKSHEET 05
Vector Spaces.

General Instructions

1. Write up a **neat** assignment on a **new sheet** of paper. (Do not cram your answers between the lines).
2. **Number** your problems so that it is easy to see what work matches the assigned problems.
3. Remember to **give examples** (you do not understand a concept unless you can provide an example of it).

Definitions and Examples

1. What is a *linear combination*? Give a definition and an example.
2. What is the *span* of vectors? Give a definition and an example.
3. What are *standard generators*? Give a definition and an example.
4. What is a *homogeneous linear equation*? Give a definition and an example.
5. What is a *homogeneous linear system*? Give a definition and an example.
6. What is a *vector space*? Give a definition and an example.
7. What is a *subspace*? Give a definition and an example.

Problems

8. Let a, b be real numbers. Consider the equation $z = ax + by$. Show that there are two 3-vectors $\hat{v_1}$, $\hat{v_2}$ such that the set of points $[x, y, z]$ satisfying the equation is exactly the set of linear combinations of $\hat{v_1}$ and $\hat{v_2}$.
(Hint: Specify the vectors using formulas involving a, b.)
9. Let a, b, c be real numbers. Consider the equation $z = ax + by + c$. Show that there are three 3-vectors $\hat{v_0}$, $\hat{v_1}$, $\hat{v_2}$ such that the set of points $[x, y, z]$ satisfying the equation is exactly $\{\hat{v_0} + \alpha_1\hat{v_1} + \alpha_2\hat{v_2} : \alpha_1, \alpha_2 \in \mathbb{R}\}$.
(Hint: Specify the vectors using formulas involving a, b, c.)