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. Consider the equation $z = 3x + 4y$. 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 $\hat{v}_2$.

9. Consider the equation $z = 3x + 4y + 5$. 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 $\{\hat{v}_0 + \alpha_1 \hat{v}_1 + \alpha_2 \hat{v}_2 : \alpha_1, \alpha_2 \in \mathbb{R}\}$.