Last name _____

First name _____

LARSON—MATH 310–HOMEWORK WORKSHEET 03
Math Review Questions from our Text.

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).

Read Chapter 2 of Klein's *Coding the Matrix* text and then answer the following questions.

1. What is vector addition? Explain and give an example.
2. What is the geometric interpretation of vector addition? Explain and give an example.
3. What is scalar-vector multiplication? Explain and give an example.
4. How is scalar-vector multiplication used to represent the line through the origin and a given point? Explain and give an example.
5. How are scalar-vector multiplication and vector addition used to represent the line through a pair of given points? Explain and give an example.
6. What is dot-product? Explain and give an example.
7. What is a linear equation (expressed using dot-product)? Explain and give an example.
8. What is a linear system? Explain and give an example.
9. What is an upper-triangular linear system? Explain and give an example.
10. For vectors $\hat{v} = [-1, 3]$ and $\hat{u} = [0, 4]$, find the vectors $\hat{v} + \hat{u}$, $\hat{v} - \hat{u}$, and $3\hat{v} - 2\hat{u}$. Draw these vectors as arrows on the same graph.
11. Over (the problem is on other side of this sheet).

Formulating equations using dot-product

Problem 2.14.7: Consider the equations

$$\begin{array}{rcrcrcrcl} 2x_0 & + & 3x_1 & - & 4x_2 & + & x_3 & = & 10 \\ x_0 & - & 5x_1 & + & 2x_2 & + & 0x_3 & = & 35 \\ 4x_0 & + & x_1 & - & x_2 & - & x_3 & = & 8 \end{array}$$

Your job is not to solve these equations but to formulate them using dot-product. In particular, come up with three vectors `v1`, `v2`, and `v3` represented as lists so that the above equations are equivalent to

$$\begin{aligned} \texttt{v1} \cdot \boldsymbol{x} &= 10 \\ \texttt{v2} \cdot \boldsymbol{x} &= 35 \\ \texttt{v3} \cdot \boldsymbol{x} &= 8 \end{aligned}$$

where x is a 4-vector over $\mathbb{R}$.