Last name _____

First name _____

LARSON—MATH 310–CLASSROOM WORKSHEET 07
Vectors!

Review

1. **Definition**. For a field $\mathbb{F}$ and a positive integer n, a vector with n entries, each belonging to $\mathbb{F}$, is called an *n-vector* over $\mathbb{F}$. The set of n-vectors over $\mathbb{F}$ is $\mathbb{F}^n$.
2. **Definition**: A vector with four entries, each of which is a real number, is called a 4-*vector* over $\mathbb{R}$.
3. How does our author view vectors as *functions*?
4. How does our author's Python implementation connect the vector definition with Python dictionaries?
5. What is the definition for adding n-vectors?
6. Why is addition of n-vectors commutative and associative?
7. How can we view n-vectors geometrically?
8. What is the definition for multiplication of an n-vector by a scalar?

Chapter 2 of Klein's *Coding the Matrix* text

1. What are the *distribution laws* for scalar-vector multiplication and vector addition?

2. What is a *convex combination* of vectors?

3. Why does $\hat{v} + \alpha(\hat{w} - \hat{v})$ (for $0 \leq \alpha \leq 1$) give all the points on the line from $\hat{v}$ to $\hat{w}$?

4. What are these points the convex combination of $\hat{v}$ and $\hat{w}$?

5. What is the *dot product* of two n-vectors?

6. Why is the dot product of n-vectors commutative?

7. How can we extend this idea to the *dot product* of two D-vectors?

8. What is an *upper-triangular* system of linear equations?

9. How can we use *backward substitution* to solve such a system?