Last name ______________________

First name ______________________

LARSON—MATH 310–CLASSROOM WORKSHEET 09
Vectors!

Review

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?

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

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

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

Chapter 3 of Klein's *Coding the Matrix* text

3. What is a *linear combination* of vectors $\hat{v}_1, \ldots, \hat{v}_n$?

4. What is the *span* of vectors $\hat{v}_1, \ldots, \hat{v}_n$?

5. Let $\mathcal{V}$ be a set of vectors. What is a *generating set* of vectors for $\mathcal{V}$?

6. What is $\mathbb{R}^n$?

7. What are the *standard* generators for $\mathbb{R}^n$?

8. Book problem:

> **Exercise 3.2.15:** For each of the subproblems, you are to investigate whether the given vectors span $\mathbb{R}^2$. If possible, write each of the standard generators for $\mathbb{R}^2$ as a linear combination of the given vectors. If doing this is impossible for one of the subproblems, you should first add one additional vector and then do it.
>
> 1. $[1, 2], [3, 4]$
> 2. $[1, 1], [2, 2], [3, 3]$
> 3. $[1, 1], [1, -1], [0, 1]$