Last name _____

First name _____

LARSON—MATH 610–CLASSROOM WORKSHEET 01
Linear Algebra Background.

Chapter 0 of Garcia and Horn's's *Matrix Mathematics* text

1. What is a *field*? What are $\mathbb{R}$, $\mathbb{C}$?

2. What is $\mathbb{M}_{m\times n}(\mathbb{C})$? What is $\mathbb{M}_{m\times n}$? What is $\mathbb{M}_n$?

3. How is *matrix multiplication* defined?

4. If AB is defined and $B = [\hat{b}_1\hat{b}_2\ldots\hat{b}_n]$, what is another way to think of muliplication of B by A?

5. What is an *invertible* matrix?

6. What is the *conjugate* of a matrix $A \in \mathbb{M}_{m\times n}$?

7. What is the *conjugate transpose* (or *adjoint*) A^* of a matrix $A \in \mathbb{M}_{m\times n}$?

8. What is a *symmetric* matrix?

9. What is a *Hermitian* matrix? Check that $\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$ is Hermitian but not symmetric.

10. What is a *normal* matrix? Check that $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ is normal but not Hermitian.

Think: symmetric $\subseteq$ Hermitian $\subseteq$ normal.