

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  $B = [\hat{b}_1 \hat{b}_2 \dots \hat{b}_n]$ , what is another way to think of multiplication 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  $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$  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.