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First name _____

LARSON—MATH 610—HOMEWORK WORKSHEET 12
Normal Matrices, Schur Decomposition.

1. Consider $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix} \in \mathbb{M}_3(\mathbb{C})$. Show: A is normal but not Hermitian.

2. Find a Schur triangular decomposition for A . Show your work (and explain how you found it).

(One possible approach is to notice that $\lambda_1 = 2$ is an eigenvalue with eigenvector $\hat{q} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, build a unitary matrix from this like we did in class, and leverage ideas from the proof of the theorem).

3. Let $T \in \mathbb{M}_4(\mathbb{C})$. Show: if T is triangular and normal then T is diagonal. Imitate out proof from class. There should be three iterations (no induction is needed).