

Group Members Names: _____

Fall 2025 Math 310 Schwitzerlett Worksheet # 3 September 23, 2025

Work each problem thoroughly, show all necessary work. Each group should turn in 1 paper.

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1. Given $S = \begin{bmatrix} 4 & -2 & 3 \\ 0 & 1 & -1 \\ 4 & 0 & 6 \end{bmatrix}$, factor S into $S = LU$ where L and U are lower and upper triangular.

2. Let A be a (2×2) matrix, and define the matrices

$$B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} \text{ and } C = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}.$$

If $A^T B^{-1} = C$, what is the matrix A ?

3. Let $\vec{a} = \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix}$, and let \mathcal{W} be the subset of vectors in \mathbb{R}^3 that satisfy $\vec{a} \cdot \vec{x} = 0$.

$$\mathcal{W} = \{\vec{x} \in \mathbb{R}^3 \mid \vec{a} \cdot \vec{x} = 0\}$$

Verify that \mathcal{W} is a subspace of \mathbb{R}^3 .