

Group Members Names: _____

Fall 2025 Math 310 Schwitzerlett Worksheet # 4 October 30, 2025

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

1. Suppose \mathbf{S} is a subspace of \mathbb{R}^3 ,

(a) If \mathbf{S} contains only the zero vector what is \mathbf{S}^\perp ?

(b) If \mathbf{S} is spanned by $(1, 1, 1)$, what is \mathbf{S}^\perp ?

(c) If \mathbf{S} is spanned by $(1, 1, 1)$ and $(1, 1, -1)$, what is a basis for \mathbf{S}^\perp ?

2. Find the projection of vector \vec{b} onto the line through \mathbf{a} . Show that \vec{e} is orthogonal to \mathbf{a} .

$$\vec{b} = \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix} \quad \mathbf{a} = \begin{bmatrix} -1 \\ -3 \\ -1 \end{bmatrix}$$

3. Let $\vec{b} = \begin{bmatrix} 0 \\ 2 \\ 4 \end{bmatrix}$ and $A = \begin{bmatrix} 0 & 1 \\ 1 & 2 \\ 2 & 0 \end{bmatrix}$. Find \vec{p} and P when projecting \vec{b} onto the column space of A .

4. Consider the following points.

$$(0,0), (1, 8), (3, 8), (4, 20)$$

Find the line of best fit $b = D + Ct$ and vectors \vec{p} and \vec{e} .