Name _____

Fall 2025 Math 307 Sec 004 Schwitzerlett Quiz #3 november , 2025

Work each problem thoroughly showing all work.

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1. Consider the vectors $\vec{a} = (5, -3, 1)$ and $\vec{b} = (1, -1, 0)$.

   (a) Find the projection of $\vec{b}$ onto $\vec{a}$.

   (b) Find P, the projection matrix.

2. Find the line $y = D + Cx$ that fits the points $(0, 1), (1, 3), (2, 5)$.

3. Appy the Gram-Schmidt orthonormalization process to transform the given basis for $\mathbb{R}^3$ into an orthonormal basis. Use the vectors in the order in which they are given.

$$\vec{a} = (2, 1, -2) \qquad \vec{b} = (1, 2, 2) \qquad \vec{c} = (2, -2, 1)$$

4. Find the orthogonal complement $(S^{\perp})$ of the subspace S of $\mathbb{R}^4$ that is spanned by the column space of the matrix A.

$$A = \begin{bmatrix} 1 & 0 \\ 2 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix}$$