

(Homework VIII) Math 31AH Fall 2025

Assume $\mathbb{N}, \mathbb{Q}, \mathbb{R}$ are used in the usual sense. We are using same notations as in class. $\mathcal{L}(S)$ denotes the linear span of S , and \mathcal{E}_m denotes the standard basis of \mathbb{R}^m .

Problem I. Let $S \subset \mathbb{R}^4$ be a linear subspace spanned by the vectors

$$\begin{bmatrix} 1 \\ 2 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 4 \\ 3 \\ 2 \\ 1 \end{bmatrix}.$$

Find an orthonormal set that spans S .