

Show full justification of every answer. There is only one question, but it has 4 parts.

(1) (5+5+15+5 points) Here is a set of vectors: $S = \left\{ \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \right\} \subset \mathbb{R}^3$. In this

problem use the dot product in \mathbb{R}^3 .

- (a) Is S an orthogonal set?
- (b) Is S a basis for \mathbb{R}^3 ?
- (c) Use the Gram–Schmidt process to turn S into an orthogonal set S' .
- (d) Is S' a basis for \mathbb{R}^3 ? You should be able to give a short reason.