

Show all necessary reasoning and work for full credit.

(1) (2+6+6+6 points) Consider the set $S = \left\{ \begin{bmatrix} 1 \\ 4 \\ 3 \end{bmatrix}, \begin{bmatrix} 5 \\ 3 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \right\}$ in the vector space \mathbb{R}^3 .

- (a) What is the dimension of the vector space? (No work needed.)
- (b) Is the set linearly dependent?
- (c) Does the set span the vector space?
- (d) Is the set a basis for the vector space?