

$$\text{Let } \mathbf{a}_1 = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}, \mathbf{a}_2 = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix} \text{ and } \mathbf{a}_3 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \text{ and } \mathbf{a}_4 = \begin{bmatrix} 4 \\ 0 \\ 4 \end{bmatrix}.$$

1. Show that  $\{\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3, \mathbf{a}_4\}$  is linearly dependent by finding a nontrivial linear combination of the vectors which is 0.
  2. Find a linearly independent subset of them which contains as many vectors as possible.
  3. Express the remaining vector (or vectors) as a linear combination of your linearly independent subset.
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