DEF **Basis**

A ***basis*** for a subspace $\mathcal{V}$ is a linearly independent set of vectors, $\mathcal{B}$, so that $\operatorname{span}\mathcal{B} = \mathcal{V}$.

DEF **Dimension**

The ***dimension*** of a subspace V is the number of elements in a basis for V.

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35 Let $\vec{u} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, $\vec{v} = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, $\vec{w} = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, and $V = \operatorname{span}\{\vec{u}, \vec{v}, \vec{w}\}$.

35.1 Describe V.

35.2 Is $\{\vec{u}, \vec{v}, \vec{w}\}$ a basis for V? Why or why not?

35.3 Give a basis for V.

35.4 Give another basis for V.

35.5 Is $\operatorname{span}\{\vec{u}, \vec{v}\}$ a basis for V? Why or why not?

35.6 What is the dimension of V?

36 Let $\vec{a} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, $\vec{b} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$, $\vec{c} = \begin{bmatrix} 7 \\ 8 \\ 8 \end{bmatrix}$ (notice these vectors are linearly independent) and let $P = \text{span}\{\vec{a}, \vec{b}\}$ and $Q = \text{span}\{\vec{b}, \vec{c}\}$.

36.1 Give a basis for and the dimension of P.

36.2 Give a basis for and the dimension of Q.

36.3 Is $P \cap Q$ a subspace? If so, give a basis for it and its dimension.

36.4 Is $P \cup Q$ a subspace? If so, give a basis for it and its dimension.