# Math 221
# Class Exercises: Feb. 9

Let $V$ be the subspace of $\mathbb{R}^3$ spanned by $v_1$ and $v_2$ and $W$ be the subspace of $\mathbb{R}^3$ spanned by $w_1$ and $w_2$.

$$v_1 = \begin{bmatrix} 5 \\ 2 \\ -1 \end{bmatrix} \qquad v_2 = \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix} \qquad w_1 = \begin{bmatrix} 4 \\ 1 \\ 1 \end{bmatrix} \qquad w_2 = \begin{bmatrix} 3 \\ 1 \\ 3 \end{bmatrix}$$

1. Is it true that $V + W = \mathbb{R}^3$? Explain.
2. Is it true that $V \oplus W = \mathbb{R}^3$? Explain.

Find one vector in $\mathbb{R}^4$ that is in $\mathcal{C}(B)$ and one vector in $\mathbb{R}^4$ that is *not in* $\mathcal{C}(B)$.

$$B = \begin{bmatrix} 1 & -1 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 2 & 0 & 2 & 1 \\ 1 & 0 & 1 & -1 \end{bmatrix}$$

Let $V$ be a vector space and suppose that the set of vectors $\{u, v, w\}$ in $V$ is linearly independent. Is the set $\{u + v, v - w, u + v + w\}$ also linearly independent? Explain.