

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. One corner of a tetrahedron is defined by the vectors $\vec{u}_1 = \begin{bmatrix} -4 \\ 2 \\ -3 \end{bmatrix}$, $\vec{u}_2 = \begin{bmatrix} 1 \\ -1 \\ 5 \end{bmatrix}$, $\vec{u}_3 = \begin{bmatrix} 3 \\ 4 \\ 1 \end{bmatrix}$. Find the volume of the tetrahedron.

2. Determine if the vectors $\vec{u}_1 = \begin{bmatrix} 1 \\ 2 \\ 1 \\ 0 \end{bmatrix}$, $\vec{u}_2 = \begin{bmatrix} -4 \\ 1 \\ 3 \\ -1 \end{bmatrix}$, $\vec{u}_3 = \begin{bmatrix} 2 \\ 2 \\ 0 \\ 1 \end{bmatrix}$, $\vec{u}_4 = \begin{bmatrix} 0 \\ 2 \\ -3 \\ 0 \end{bmatrix}$ form a basis for R^4 . Explain your reasoning. If they do not form a basis for R^4 , explain why not.