1. Let $A = \begin{bmatrix} 1 & 2 & 2 & -7 & 6 \\ 2 & 4 & 5 & -16 & 13 \\ -3 & -6 & -4 & 17 & -16 \\ 4 & 8 & 8 & -28 & 24 \end{bmatrix}$. Use that $\text{REF}(A) = \begin{bmatrix} 1 & 2 & 0 & -3 & 4 \\ 0 & 0 & 1 & -2 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

   (a) Give a basis for $\text{col}(A)$ and a basis for $\text{nul}(A)$.

   (b) Describe $\text{col}(A)$ and $\text{nul}(A)$ geometrically.

2. Let $\mathcal{H}$ be the subspace of $\mathbb{R}^4$ spanned by $\mathbf{v_1} = \begin{bmatrix} 2 \\ 4 \\ -2 \\ 8 \end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix} 1 \\ 5 \\ -4 \\ 7 \end{bmatrix}$, and $\mathbf{v_3} = \begin{bmatrix} 1 \\ 2 \\ -1 \\ 4 \end{bmatrix}$.

   Give a basis for $\mathcal{H}$ and describe $\mathcal{H}$ geometrically.