1. What criteria must we show to prove that $H \subset \mathbb{R}^n$ is a **subspace**?

2. What does it mean for a set of vectors $\{\mathbf{u}_1, \ldots, \mathbf{u}_p\}$ to be **linearly independent**? (state the definition, not a method to compute.)

3. Consider the vectors $\mathbf{u}_1 = \begin{bmatrix} 3 \\ -3 \\ 0 \end{bmatrix}$, $\mathbf{u}_2 = \begin{bmatrix} 2 \\ 2 \\ -1 \end{bmatrix}$ and $\mathbf{u}_3 = \begin{bmatrix} 1 \\ 1 \\ 4 \end{bmatrix}$. Compute the following:

   a. $\mathbf{u}_1 \cdot \mathbf{u}_2$

   b. $\mathbf{u}_2 \cdot \mathbf{u}_3$

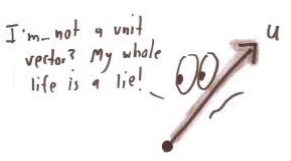
   c. $\mathbf{u}_1 \cdot \mathbf{u}_3$

   d. $\mathbf{u}_1 \cdot \mathbf{u}_1$

   e. $\mathbf{u}_2 \cdot \mathbf{u}_2$

   f. $\|\mathbf{u}_3\|$

There once was a vector named u
who just didn't know what to do:
By its name you'd assume it
had length of one unit
but its magnitude equaled to two.



https://mathwithbaddrawings.com/2017/03/15/limericks-for-mathematicians/