$\quad$ **Quiz 5** $\quad$

<u>Instructions:</u> Please answer the following legibly, logically, and **show all work**. Please use a **separate sheet of paper** to write all work. No credit will be given for unjustified or unclear work. When you are finished, please scan your work (or take pictures) and submit via the Assignments or Quiz link on Canvas.

1. Let V be the first quadrant in the xy-plane; that is, let $V = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : x \geq 0, y \geq 0 \right\}$.

    (a) If $\mathbf{u}$ and $\mathbf{v}$ are in V, is $\mathbf{u} + \mathbf{v}$ in V? Why?

    (b) Find a specific vector $\mathbf{u}$ in V and specific scalar c such that $c\mathbf{u}$ is *not* in V. (This shows that V is not a vector space.)
    Remember, you need to pick actual numbers for x, y and c.

2. Let H be the set of all polynomials of the form $\mathbf{p}(t) = at^2$, where a is in $\mathbb{R}$. Show that H is a subspace of $\mathbb{P}_2$. Note that if a vector $\mathbf{p}(t)$ is in $\mathbb{P}_2$, then $\mathbf{p}(t) = a_0 + a_1 t + a_2 t^2$, where a_0, a_1 and a_2 are in $\mathbb{R}$.

3. For the matrix A given below, find a nonzero vector in Nul A and a nonzero vector in Col A.
$$A = \begin{bmatrix} 6 & -4 \\ -3 & 2 \\ -9 & 6 \\ 9 & -6 \end{bmatrix}$$