Quiz 2

1. Let V be the set of all ordered pairs of real numbers with the operations $(x, y) \oplus (x', y') = (x+x', y+y')$ and $r \odot (x, y) = (0, rxy)$. Check if this satisfies the following property of a vector space:
   $(c + d) \odot \mathbf{u} = c \odot \mathbf{u} \oplus d \odot \mathbf{v}$ for any $\mathbf{u}$ in V and any real numbers c, d (3 pts)

2. Let A be an $m \times n$ matrix and $\mathbf{b}$ be a nonzero m-vector. Is the set of all solutions to the linear system $A\mathbf{x} = \mathbf{b}$ a subspace of $\mathbb{R}^n$? Why or why not? (3 pts)

3. Let $S = \left\{ \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} \right\}$. Is S a spanning set for $\mathbb{R}^3$? (4 pts)