## Problem 1.

Let $V = \mathbb{R}^+ \times \mathbb{R}$ be a set. In other words, every element of $V$ is in the form $(u_1, u_2)$, where $u_1 \in \mathbb{R}^+$ and $u_2 \in \mathbb{R}$. For all $(u_1, u_2)$ and $(v_1, v_2) \in V$, and for all $k \in \mathbb{R}$,

$$(u_1, u_2) \oplus (v_1, v_2) = (2u_1v_1, u_2 + v_2 - 3) \text{ and } k \odot (u_1, v_1) = (u_1^k, ku_2).$$

Verify the axioms 4, 5, and 7.