1. Determine whether each of the following statements is true (T) or false (F).
   (a) (2 points) If $S$ is a subspace of a vector space $V$, then $S$ is a vector space.
       (a) __________
   (b) (2 points) If $S$ and $T$ are subspaces of a vector space $V$, then $S \cap T$ is a subspace.
       (b) __________
   (c) (2 points) If $S$ and $T$ are subspaces of a vector space $V$, then $S \cup T$ is a subspace.
       (c) __________

2. (4 points) Consider the vector space $\mathbb{R}^2$. Let $S$ be the set of vectors
   \[ S = \left\{ \begin{pmatrix} 0 \\ y \end{pmatrix} : y \geq 0 \right\}. \]
   Is $S$ a subspace? If so, show that it is a subspace. If not, explain why not.