Group members (2 to 4):

To be a vector subspace, a subset W must be closed under addition and scalar multiplication: if $w_1 \in W$ and $w_2 \in W$, then for any numbers a and b, $aw_1+bw_2 \in W$.

(1) Is the subset $W = \{(x, y) \mid y \ge 0\} \subset \mathbb{R}^2$ a vector subspace of \mathbb{R}^2 ? Explain why or why not.

(2) Is the subset $W = \{(x, y) \mid y = 0 \text{ or } x = 0\} \subset \mathbb{R}^2$ a vector subspace of \mathbb{R}^2 ? Explain why or why not.

(3) Is the set of two-by-two skew-symmetric matrices $(A^T = -A)$ a vector subspace of the set of all two-by-two matrices with real entries?