Q1. Given that \( S = \{(a, b, 2a, 3a + 5b) \mid a, b \in \mathbb{R}\} \) is a subspace of \( \mathbb{R}^4 \). Find a basis of \( S \) and evaluate \( \dim(S) \). (4 points)

Q2. Let \( S = \{(a, b) \in \mathbb{R}^2 \mid ab \leq 0\} \). Is \( S \) a subspace of \( \mathbb{R}^2 \)? Give reason(s) for your answer. (3 points)

Q3. Let \( S = \{(a, b) \in \mathbb{R}^2 \mid a \leq b\} \). Is \( S \) a subspace of \( \mathbb{R}^2 \)? Give reason(s) for your answer. (3 points)