Show all work needed to reach your answers.

1. (4 points) Let \( a_n \in \mathbb{R} \) and consider the sequence \( \{a_n\} \). What does it mean to say that \( \{a_n\} \) is strictly increasing?

2. Let \( f : A \rightarrow B \) be a function, and let \( S \subseteq B \) and \( T \subseteq B \).

   (a) (4 points) Please define \( f^{-1}(S) \), the inverse image of \( S \).

   (b) (6 points) Please prove that \( f^{-1}(S \cap T) \subseteq f^{-1}(S) \cap f^{-1}(T) \).

   (c) (6 points) Please prove or disprove: \( f^{-1}(S) \cap f^{-1}(T) \subseteq f^{-1}(S \cap T) \)