Name: _____ Key _____

The following two proofs have been started for you. Please fill in the missing pieces to complete the proofs.

1. Suppose A and B are sets in some universe $\mathcal{U}$.
   Show: If $A \subseteq B$, then $A \cap B = A$.

   Proof. Let $A \subseteq B$.
   ($\subseteq$) Let $x \in A \cap B$.
   So $x \in A$ and $x \in B$.
   In particular $x \in A$.
   Therefore $A \cap B \subseteq A$.

   ($\supseteq$) Let $x \in A$.
   Since $A \subseteq B$, we have $x \in B$.
   So $x \in A$ and $x \in B$.
   Hence $x \in A \cap B$.
   Therefore $A \cap B \supseteq A$. $\square$

2. Show: $\forall x \in \mathbb{R}, x \in (-2, 1]$ if and only if $-x \in [-1, 2)$.

   Proof. Let $x \in \mathbb{R}$ be arbitrary.
   ($\rightarrow$) Let $x \in (-2, 1]$
   That is, $-2 < x \leq 1$
   Multiplication by -1 gives: $(-2)(-1) > (x)(-1) \geq (1)(-1)$
   That is, $2 > -x \geq -1$. Therefore $-x \in [-1, 2)$

   ($\leftarrow$) Let $-x \in [-1, 2)$
   That is, $-1 \leq -x < 2$
   Multiplication by -1 gives: $(-1)(-1) \geq (-x)(-1) > (2)(-1)$
   That is, $1 \geq x > -2$. Therefore $x \in (-2, 1]$ $\square$