Theorem (2.2.31)**.** *Let A, and B be subsets of a universal set U.*
$A \subseteq B \iff \overline{B} \subseteq \overline{A}$.

Proof. The proposition $A \subseteq B$ is equivalent to the universally quantified statement $\forall x(x \in A \implies x \in B)$. It is tautological that the propositional function in this statement is logically equivalent to its contrapositive form (satisfying the biconditional requirement.) That is, $\forall x(x \notin B \implies x \notin A)$ is the logically equivalent statement. By the definition for set complementation that is $\forall x(x \in \overline{B} \implies x \in \overline{A})$. By universal generalization
$A \subseteq B \iff \overline{B} \subseteq \overline{A}$. ■