NAME: Solution

2.2 Author a rigorous proof utilizing classical reasoning ("proof by contradiction").

Prove the following claim using set inclusion principles:

Claim. $A - B \equiv \emptyset \quad \textit{if} \quad A \subseteq B$.

Assume by way of contradiction that $A - B$ is not empty. Then there exists some $x \in A - B$. This means that $x \in A$ and $x \notin B$. However, since $A \subseteq B$, we know that for all $x \in A$, then $x \in B$. So we have shown that $x \notin B$ and $x \in B$. This is a contradiction. Therefore we can conclude that no such x exists, and so $A - B$ must be empty when $A \subseteq B$.

NAME: ______________________________