Assignment 2 - Hand in by Sept. 29 in class

This assignment is based on Sections 1 and 2 of the notes posted on the course website.

1. Let $A$ and $B$ be sets. Suppose $f:A \to B$ and $g:B \to A$, and $g \circ f = I$ (the identity function on $A$.) $(I(x) = x$ for all $x \in A.)$ Prove that $f$ is 1-1 and that $g$ is onto.

2. If $A$ and $B$ are finite sets, prove using the results in Section 2 that that $|A \cup B| \leq |A| + |B|$.

3. If $S$ is a finite set, and $A$ and $B$ are subsets of $S$ such that $|A| > |S|/2$ and $|B| > |S|/2$, prove using the results of Section 2 that there is an element in $A \cap B$. 