Set Theory
Quiz 7

Name:_____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Assuming the axioms of ZFC, explain why $(b) \Rightarrow (a)$.[1]

    (a) $|A| \leq |B|$.

    (b) Either $A = \emptyset$ or there is a surjective function $g \colon B \to A$.

    If $A = \emptyset$, then the empty function $\emptyset \colon A \to B$ witnesses that $|A| \leq |B|$.

    Assume that $A \neq \emptyset$ and $f \colon B \to A$ is surjective. The Axiom of Choice guarantees the existence of a section $s \colon A \to B$ to f. Sections to surjective functions are injective, so s witnesses that $|A| \leq |B|$.

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[1]The implication $(a) \Rightarrow (b)$ also holds, but you don't have to prove it.