**Set Theory**
**Quiz 4**

**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. Show that every nonzero natural number is the successor of some natural number.

Let's use induction to prove $P(x)$: "$(x = 0) \vee \exists k(x = S(k))$".

Basis: $P(0)$ holds trivially.

Inductive step: Assume that $P(n)$ holds for some natural number $n$. We must prove that $P(S(n))$ holds. That is, we must show that if $S(n)$ is nonzero, then $S(n)$ is the successor of some natural number. But of course this is true, because $S(n)$ is the successor of $n$. (That is, to prove that $P(x)$ holds for $x = S(n)$, take $k = n$.)