

Math 475 Homework 2
DUE FEBRUARY 12TH, 2010

1. Recall Peano's Axioms from Worksheet 1. Define a set N and a function $S : N \rightarrow N$ that
 - (a) fulfill all of Peano's Axioms, except for Axiom 2.
 - (b) fulfill all of Peano's Axioms, except for Axiom 3.
 - (c) fulfill all of Peano's Axioms, except for Axiom 4.

In the following problems, proofs should assume only axioms and definitions and facts proved in class.

2. Prove $3 + 2 = 5$.
3. Prove that every natural number's successor is greater than that natural number.
4. Prove $0 + a = a + 0$ and $1 + a = a + 1$ for all $a \in \mathbb{N}$.
5. Prove addition is commutative, i.e. $a + b = b + a$ for all $a, b \in \mathbb{N}$. (*Hint*: You may find the last problem handy.)