

Math 347 – Homework assignment #4

posted September 18, 2008; due Wednesday, September 24, 2008

Textbook problems

4.5, 4.8, 4.21, 4.31, 4.34, 4.37

Additional problems

Hint: The magic words for the first two of these exercises are “induction on n .”

1. In this exercise we prove that the *size* of a finite set is well-defined. Suppose n and m are nonnegative integers (i.e., elements of $\mathbb{N} \cup \{0\}$).
 - (a) Show that if there is an injective function from $[n]$ to $[m]$, then $n \leq m$.
 - (b) Show that if there is a surjective function from $[n]$ to $[m]$, then $n \geq m$.
 - (c) Show that if there is a bijection between $[n]$ and $[m]$, then $n = m$.
2. Suppose A is a finite set of size n . Prove that if B is a proper subset of A , then B has size m for some $m < n$.
3. Suppose A is a set and B is a proper subset of A . Show that if there is an injective function from A to B , then A is infinite.