

CS 380 Theory of Computation  
Spring 2008  
Homework 2  
Due Jan 24

1. Prove that the set of all ordered pairs of integers is countably infinite.
2. Prove or disprove:
  - (a) The union of a countably infinite collection of countably infinite sets is countably infinite.
  - (b) The Cartesian product of countable infinite collection of countably infinite sets is countably infinite.
3. Write grammar for:
  - i. The set of all strings ending in 00.
  - ii. The set of all strings with three consecutive 0's.Where  $\Sigma = \{0, 1\}$ .