Homework 12, Morally due Tue May 14, 3:30PM

THIS HW IS ONE PAGES!!!!!!!!!!

WHEN IS THE FINAL? Saturday May 18, 4-6

WHERE IS THE FINAL? PHYSICS 1201

1. (30 points — 10 each) Show that the following sets are uncountable

   (a) The set of functions from N to N that are strictly increasing. (That means that, for all $x, y \in \mathsf{N}$, if $x < y$ then $f(x) < f(y)$.)

   (b) The set of functions from N to PRIMES.

   (c) The set of functions from N to PRIMES that are strictly increasing.

2. (40 points — 20 points each) Let $(A, \leq_1)$ and $(B, \leq_2)$ be ordered sets. An *order preserving bijection f from A to B* is a bijection from A to B such that, for all $x, y \in A$.

$$x \leq_1 y \rightarrow f(x) \leq_2 f(y).$$

   (a) Show that there is NO order preserving bijections from N to Z.

   (b) Show that there is NO order preserving bijections from N to $\mathsf{Q}^{\geq 0}$. (Thats the rationals ≥ 0.)

3. (30 points) Prove or disprove: If $A_1, A_2, \ldots$ are countable and disjoint then $A_1 \times A_2 \times A_3 \times \cdots$ is countable.