

U.T. Economics Summer 2011 Math Camp

Date: Monday, August 1, (B)

Topics: Indicator functions, quantifiers

Readings: CSZ, Ch. 1, 2.1 - 3.

- A. Express the following arguments in terms of sets and indicator functions, decide whether or not the conclusions follow from the premises, and prove your answer.
1. All professors are wise people, Max Stinchcombe is a professor, therefore there exists a wise person.
 2. Every wise person is a professor, Max Stinchcombe is a professor, therefore Max Stinchcombe is a wise person.
 3. There is at least one professor at U.T. who is wise, Max Stinchcombe is a professor, therefore Max Stinchcombe is wise.
 4. All creatures from other planets are friendly, all martians are from another planet, therefore there are friendly martians.
 5. All infinite subsets of the set $\{1, 2\}$ contain nineteen elements.
- B. Recall (or learn here for the first time) that a relation R on a set X is **antisymmetric** if $(\forall x, y \in X)[xRy \wedge yRx] \Rightarrow [x = y]$. Also, \mathbb{N} denotes the set of natural numbers, $\{1, 2, 3, \dots\}$, where the “...” indicates that you keep on going, adding 1 at each step, for ever and ever. Write out the following in terms of subsets and in terms of indicator functions. Decide which, if any, of the following two statements are true, and give arguments for your answers.
1. The relation “ \leq ” on \mathbb{N} is antisymmetric.
 2. The relation “ $<$ ” on \mathbb{N} is antisymmetric.