Class 3: Well-Ordering Principle

Schedule

This week, you should read MCS Chapter 2 and MCS Chapter 3 (at least through the end of Section 3.4).

Problem Set 1 is due **Friday at 6:29pm**.

Office hours started Monday afternoon. See the course calendar for the full office hours schedule.

Notes and Questions

What properties must a sensible ordering function have?

Definition. A set is *ordered* with respect to an ordering relation (e.g., <), if two things hold. First: every pair of inequal elements a,b in A either satisfy a 3. By the well-ordering principle, there must be ____________________ , $m \in C$. 4. Reach a contradiction (this is the creative part!). One way to reach a contradiction would be to show $P(m)$. Another way is to show there must be an element $m' \in C$ where $m' < m$. 5. Conclude that C must be empty, hence there are no counter-examples and $P(n)$ always holds.

Example: Betable Numbers. A number is *betable* if it can be produced using some combination of $2 and $5 chips. Prove that all integer values greater than $3 are betable.

Example: Division Property. Given integer a and positive integer b, there exist integers q and r such that: $a = qb + r$ and $0 \leq r < b$.

The whole problem with the world is that fools and fanatics are always so certain of themselves, and wiser people so full of doubts. Bertrand Russell

