Lecture 1: Welcome

Math 153 Section 57

Monday September 29, 2008

1 Hand out syllabus and survey

A very brief overview of the course, and an inspirational message.
Problem session scheduling.
Grading system for homework.
Final grades.

2 Review

2.1 Numbers

Natural numbers. Integers. Rationals. Reals.

2.2 Sets

The $\in$ symbol.
How to define a set?

2.3 Intervals

Open intervals. Closed intervals. Half-open intervals.

2.4 Bounds

A number b is an **upper bound** of a set A if for all $a \in A$, $a \leq b$.
A number b is a **lower bound** of a set A if for all $a \in A$, $b \leq a$.
Example: $(0, 5)$. $(-\infty, 12)$. $(2, \infty)$. $[0, 5]$.
Example: $\{0, 1, 2, 3, 4, \ldots\}$.
Example: $\{0, 0.9, 0.99, 0.999, 0.9999, \ldots\}$.
There may be many upper bounds; there may be none.
A set is **bounded above** if it has an upper bound.

A set is **bounded below** if it has a lower bound.
A set is **bounded** if it has both a lower bound and an upper bound.

3 Least upper bound axiom

Axiom: every nonempty set of real numbers bounded above has a least upper bound.
Example: $[0, 3]$. $(0, 3)$.
Example: $\{0, 0.9, 0.99, 0.999, 0.9999, \ldots\}$.
Example: rational numbers?