Chapter 3 Formal Proofs

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Feb 13, 2015

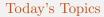
Mathematical Expression and Reasoning

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Announcements

- Assignment 2 is posted.
 - Due date: Mar 06, before midnight on MarkUs.
 - Assignments may be submitted in groups of up to two students. You may choose your group-mate from students in the other section.
 - Submissions must be **typed**.
 - The size of the PDF file **must** be less than **1MB**.
- Mid-term Course Evaluation: link posted on the course website.
 - Please fill out to let us know your comments/suggestions.
 - It is a Google form, but you **don't** have to be logged-in.
 - It is completely anonymous.
 - Takes less than 5 minutes.
- Assignment 1 will be return during the weekend.
 - Remark requests through MarkUs by Wednesday, Feb 25.

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• Exercise: Formal Proofs

Formal Proofs

Exercises

Use the proof structures in this course to **prove** or **disprove** the following claims

Consider the definition of the floor function:

 $\mathbf{D_1}: \forall x \in \mathbb{R}, \forall y \in \mathbb{Z}, (y = \lfloor x \rfloor) \Leftrightarrow (y \le x) \land (\forall z \in \mathbb{Z}, (z \le x) \Rightarrow (z \le y)).$

Use $\mathbf{D_1}$ to prove $\forall x \in \mathbb{R}, (\lfloor x \rfloor > x - 1)$

2 Use **proof by contradiction** to prove that $\forall x \in \mathbb{R}, \forall y \in \mathbb{R}, x > y \Rightarrow \lfloor x \rfloor \ge \lfloor y \rfloor$

 \bullet For $x \in \mathbb{R}$,

$$|x| = \begin{cases} -x, & x < 0\\ x, & x \ge 0 \end{cases}$$

Prove $\forall x \in \mathbb{R}, \forall y \in \mathbb{R}, |x||y| = |xy|$.