AI + Lean

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AI and math

- Large Language Models are already pretty good at math, and they are getting better.
- Main limitations:
  - Precision
  - Correctness

What is Lean?

- Language for formal mathematics that ensures correctness
- Library of theorems with proofs: Mathlib
- Requires software for verification:
  - Online playground: `https://live.lean-lang.org`
  - Local installation.
- Current version: Lean4

Lessons learned

- Use the Socratic method: get the AI to come up with its own answers.
- Scaffold proofs: start from natural language and ask the AI to respect the structure.
- Get the AI to fix the Lean itself.
- Learning a little Lean goes a long way.
- The AI can help with learning some Lean!
- Start over if things get out of hand.

Resources

- Rutgers Lean + AI seminar: Wednesdays at 2 pm.
- Running Lean: `https://live.lean-lang.org`.
- Learning Lean: Natural Number Game
- Alex Kontorovich's analysis course: Real Analysis Game