

# Replacing the Calculator

How early can we introduce literate computation?

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# Reproducibility Vision

- After training, students come to expect implementation details for any computation they encounter

# The Problem Set

- Written part transparent and reproducible
- Computation usually obscured

# My Classroom

- Wide range of calculator aptitude
- Undergraduates who don't recognize the term scientific computation
- How do I improve their computation ability?

# First Computational Tool

- Pros
  - Simple
  - Rapid
  - Order of operations and functions
  - API cheatsheet
- Drawbacks
  - No record of keystrokes or way to review
  - Opportunity for entry errors



# The Jupyter Notebook

- Read Evaluate Print Loops (REPLs) and notebooks can replace calculators with minimal disruption
- Allow reproducibility
- Allow gradual introduction of variables and other abstractions

# My Classroom

- I'm experimenting with Jupyter tools in early classes
- These are presented as simple extensions of calculators, not as tools that require an understanding of programming
- This allows students to document their calculations and get feedback on methods.
- Full disclosure: I'm using Julia

# Lowering Barriers

- Thank you for making these tools
- [try.jupyter.org](https://try.jupyter.org)
- [juliabox.org](https://juliabox.org)
- [cloud.sagemath.org](https://cloud.sagemath.org)
- [wakari.io](https://wakari.io)

