Grading Proofs

In proof based classes

My Background

- 4x Intro to proofs course
- 2x Abstract algebra

Intro to proofs: The Challenge

- The same question is relevant on day 1 and the last day of class.
  - Example: Show that the sum of two odd integers is even.
  - On day 1 they don't have a clue how to write a proof.
  - On the last day they should be writing something good.
- It can take multiple hours to grade a proof based assignment.
- Students just seem to have a difficult time understanding that the "answer" isn't everything.

My Solution: A Rubric

- Purposes
  - Consistent grading
  - Quicker grading
  - Students know where/what to improve

My Solution: A Rubric

- 5 areas:
  - Use of statements
  - Mathematical Grammar
  - Use of variables
 - Logical flow
  - Correctness

My Solution: A Rubric

- Also some time-saving techniques: multiple colors
  - Green: Things that don't make sense
  - Grammar: Things that I can decipher, but aren't written correctly
  - Use of variables: Are variables defined, and only as one thing?
  - Logical flow: Does each step follow?
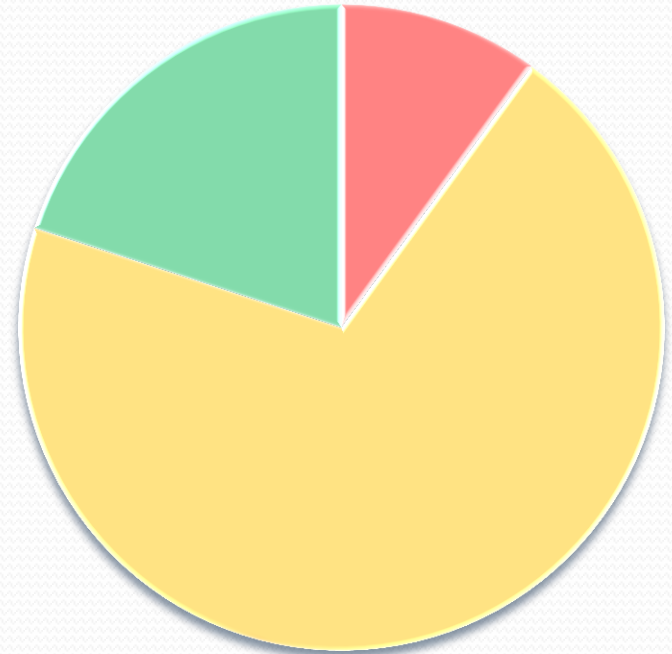 - Correctness: Does the method actually prove the theorem?

Modifications for non-intro classes

- Replace the 3 "how it's written" areas with one combined mathematical grammar section
- "Correctness" moves up to 60% of the score from 20%.

Outcomes – 3rd week of class
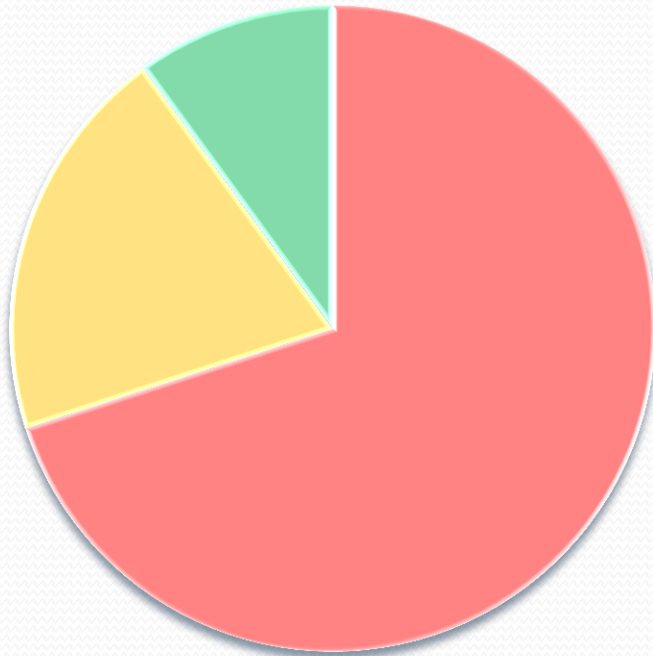
Without Rubric

With Rubric

- Horrible
- Mediocre
- Good

Future Challenges

- How to get students to write good proofs?
  - Keep showing them examples of well written proofs.
  - Have them write lots of proofs.
  - Multiple (2-4) drafts so they finally come out with something good.
  - During class type proofs instead of using the whiteboard; later upload them to Blackboard.