Midterm Review
Midterm Exam Topics

• Functional programming in OCaml
  • polymorphism, currying, partial evaluation, tail-recursion

• Operational Semantics
  • large-step & small-step semantics
  • structural induction

• Denotational Semantics
  • fixed points, fixed point induction
  • complete partial orders

• Semantic Equivalence

• (No static semantics, type safety, etc.)
Exam Logistics

• Exam held in-class (1 hour and 15 minutes)
• Counts as 25% of final grade
• Three mandatory problems (plus one bonus problem)
  • (1) OCaml programming problem
  • (2) something about operational semantics
  • (3) something about denotational semantics
• Closed book+notes, but you may bring one two-sided sheet of notes
• Difficulty level: About like the quizzes (except for the bonus problem)
Typical Problem Idioms

- Prove something by structural/fixpoint induction.
  - Or: Prove something about derivations that *doesn’t require* structural induction (e.g., prove by rearranging derivation subtrees).

- Define new operational/denotational semantics for some new language feature (e.g., side-effects on Assignment 3).

- Given some new operational/denotational semantics, write a “programmer’s manual” entry for the new language feature.
  - No mention of “stores”, “configurations”, “convergence”, etc.
  - Tests your ability to comprehend semantic specifications.
Time Management

• Recommendation:
  • Force yourself to work for 20 min. on each problem, then stop and move on.
  • Use remaining 15 min. to “clean up” unfinished work.
• Don’t plan to “rewrite it more neatly later.” (You won’t have time.)
  • Just circle your best solution and write “final answer”. Cross out (but keep) scratch work and write “scratch work”.
• Be sure you can do the following, from memory, in seconds:
  • Write the type of fold_left (iterator function (2 args!), base, list)
  • Set up a structural induction proof (“Proof is by…”, IH, Cases, etc.)
  • Set up a fixpoint induction proof (“Proof is by…”, Base Case, IH, “Let … be given.”, Cases)
Cheat Sheet

- Bring one 8.5x11 sheet of paper with anything you wish written on it front and back.
- I will give you the midterm exam reference section, so don’t bother with that.
- Recommendation:
  - Write your cheat sheet by hand. Best way to teach yourself the material!
  - If you photocopy everything in miniature:
    - You’ll waste exam time sifting through all those notes. Time killer.
    - You’ll expect to “figure out the notes” during the exam. Usually ends badly.
    - You won’t really study what you’re putting into your notes. Missed study opportunity.
Today’s Review

• You drive the lecture: Would you like me to...
  • re-teach or clarify any past lecture concepts?
  • solve any past quizzes or homework problems on the board?
  • solve the sample exam questions on the board (default option)?