CS103 Daily Doggie Bag 12

The most important topics and details of the day.

March 2, 2006

**Topic 1. Midterm review.** Following are the main topics we have covered so far, and which are fair game for the midterm exam.

1. Basic computability
   - (a) Computable functions
   - (b) Turing machines
   - (c) Turing completeness
2. Dynamic vs. static program properties
   - (a) Evaluation of OCaml programs
   - (b) Typing of OCaml programs, as static prediction of evaluation results
3. Variable declarations and binding
   - (a) Scoping rules for OCaml expressions (e.g. let, fun, match)
   - (b) Dynamic vs. static scoping
4. Built-in OCaml base and compound types
   - (a) int, bool, ...
   - (b) Tuples
   - (c) Lists
   - (d) Typing and evaluation rules
5. User-defined OCaml types
   - (a) Variants
   - (b) Records
   - (c) Typing and evaluation rules
6. Polymorphic types
   - (a) Polymorphic functions
   - (b) Polymorphic datastructures (e.g. lists, trees)
7. Pattern matching
8. Functional evaluation
   - (a) Function definitions and application
   - (b) Typing and evaluation rules
     - i. Call-by-name vs. call-by-value
(c) Curried vs. uncurried functions
(d) Recursive functions
   i. Recursion and induction
(e) Higher-order functions

9. Abstracting patterns of control
   (a) On lists: map, fold, member
   (b) On other datastructures: treemap, treefold, ...

10. Mutation and state
    (a) Reference creation, access, update
    (b) Sequencing and evaluation order
    (c) Non-local effects