University of Virginia 5 September 2011
cs1120: Introduction of Computing
Explorations in Language, Logic, and Machines

Class 6: Programming with Data

Assignments Due

- **Now:** Problem Set 1 (both on-line submission and paper)
- **Wednesday, 7 September** (in class): **Quiz 1**: covers Chapters 1-4 of course book, Chapters 1-3 of *The Information*, Classes 1-5 (including questions)
- **Wednesday, 14 September: Problem Set 2** (partner assignments will be posted by tomorrow, but you do not need to wait until then to get started)

Upcoming Help Schedule (all office hours are now in Rice Hall)

- Today: noon-1:30pm (Kristina, Rice 1st), 1-2pm (Dave, Rice 507)
- Tuesday: 11am-noon (Dave, Rice 507); 5-8pm (Valerie/Jonathan, Rice 1st)

Recap: Procedures Practice

Define a procedure, **middle**, that takes three numbers as inputs, and outputs the number that is in the middle.

Define a procedure, **find-fixedpoint**, that takes as input a function and an initial value, and outputs the fixed point of the function starting from that value. A fixed point of a function *f* is a value *x* such that (f *x*) evaluates to *x*.

Given two procedures that implement the same function, how should one decide which is *better*?

Programming with Data

Is it better to solve problems by thinking about what we need to *do* to solve the problem (*procedures*) or by thinking about what we need to represent to solve the problem (*data*)?

A *Pair* packages two data values together. The built-in procedures for manipulating Pairs include:

cons:	Value x Value → Pair	Outputs a Pair containing the two input values in its cells.
car:	Pair → Value	Outputs the first cell of the input Pair.
cdr:	Pair → Value	Outputs the second cell of the input Pair.

What does (**car** (**cons** *x y*)) evaluate to?

What does (**cdr** (**cons** *x y*)) evaluate to?

What is the value of (**car** (**cdr** (**cons** 1 (**cons** 2 (**cons** 3 **null**))))?

Could we define **cons**, **car**, and **cdr** ourselves if Scheme did not have them as primitives?