CompSci 100e
Program Design and Analysis II

February 24, 2011
Prof. Rodger
Announcements

• APT-0301 set due March 1, do 3 of 6
  – Will look at 3 of them in lab this week, but you should look at them and try them before lab.

• Next assignment is written and due March 3
  – Amortize “means” occasionally it is expensive, but usually much faster. You would apply n operations and then take the average to find the cost of one operation
Recursion

• Method calls a clone of itself
• Solves a problem by solving smaller subproblems
• “looping” by recursive calls
  – CAUTION – don’t add a loop, it is implicit
• Example: see SumItUp.java
• Example: See Hanoi.java
Example: SumItUp

• Calculates and prints the sum of integers in an array
• Also prints the numbers
• For you todo: print the numbers in reverse using recursion

• Another Example: Towers of Hanoi
  – Multiple recursion
  – See Hanoi.java
Recursion (more)

• Watch out for infinite recursion
  – No way out, what happens?
  – Segmentation fault, out of memory

• Rules
  – Base case (way out) – no recursive call
  – Recursive call(s) – solve a smaller problem
Recursion vs Iteration
Which method do you use?

• Iteration
  – Easier to define
  – Faster – recursion takes some overhead

• Recursion
  – Easier to define
  – Shorter code
Types of Recursion

• Tail recursion
  – One recursive call at the end of a method
  – Easy to replace with a loop

• Reverse something
  – One recursive call “before” process

• Multiple Recursion
  – More than one recursive call
Classwork

• Recursively access directories
• Use File class
  – isDirectory() – true if file is a directory
  – Length() – size of file