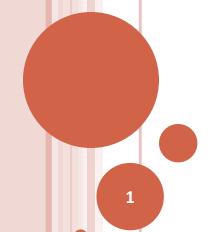
CS F364 Design & Analysis of Algorithms

ALGORITHM DESIGN TECHNIQUES

Comparison:

Top-Down Design vs. Bottom-up Design
Divide-and-Conquer vs. Dynamic Programming



TOP DOWN DESIGN VS. BOTTOM UP DESIGN

Top Down Design

- Strategy: Divide problem
 - Start: Given problem
 - End: Atomic problems
- Strength:
 - Easy to frame solutions for new problems
- o Weakness:
 - Overlapping subproblems may be solved more than once

Bottom Up Design

- Strategy: Combine solutions
 - Start: Atomic solutions
 - End: Solution to given problem
- Weakness:
 - Problem structure must be analyzed apriori
 - o If not, what happens?
- Strength:
 - Every sub-problem is solved at most once.

DIVIDE AND CONQUER VS. DYNAMIC PROGRAMMING

Top Down Design

- Divide and Conquer is a special case of Top Down Design:
 - sub problems have the same structure as the given problem

Bottom Up Design

- Dynamic Programming is a special case of Bottom Up Design:
 - Solution to the given problem has the same structure as those of the sub problems