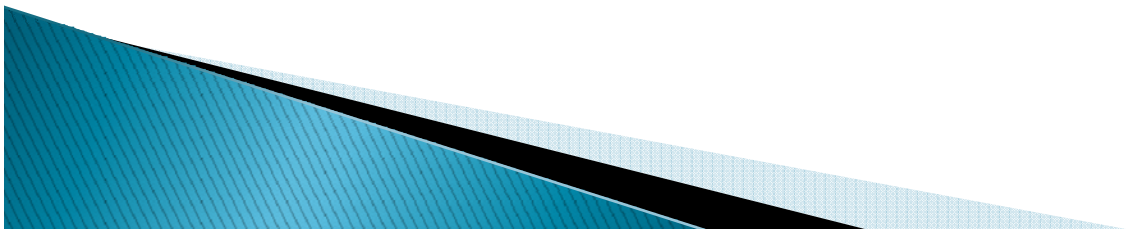


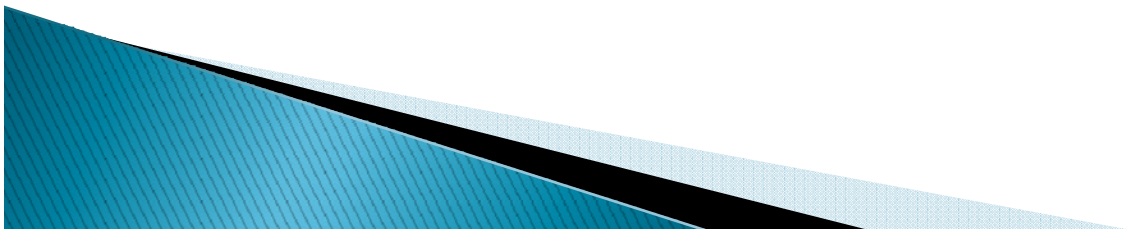
Dynamic Programming

- ▶ An algorithm design technique
- ▶ “Programming” refers to a tabular method with a series of choices, not “coding”



Dynamic Programming ...cntd

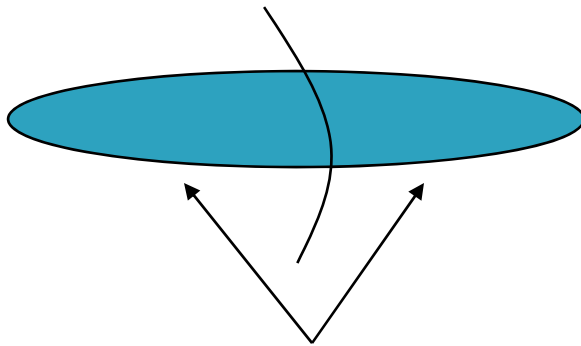
- ▶ Dynamic programming is used, when the solution can be recursively described in terms of solutions to subproblems (*optimal substructure*)
- ▶ Solves *optimization problems* by combining solutions to subproblems
- ▶ The key is to *store* the solutions of subproblems to be *reused* in the future



DP - Two key ingredients

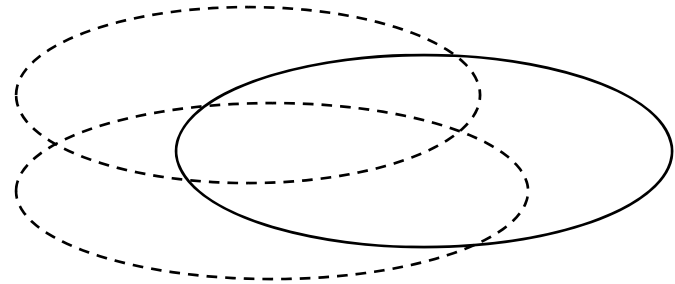
- ▶ For dynamic programming to be applicable, an optimization problem must have two key ingredients :

1. optimal substructures



Each substructure is optimal.
(Principle of optimality)

2. overlapping subproblems

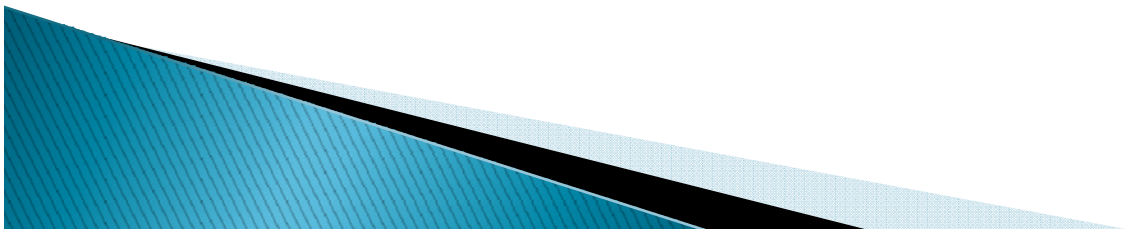


Subproblems are dependent.

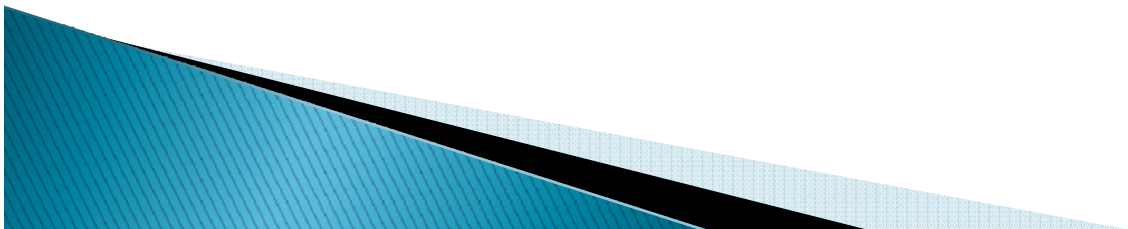


A Sequence of 4 Steps

- ▶ A dynamic programming approach consists of a sequence of 4 steps:
 1. Characterize the structure of an optimal solution
 2. Recursively define the value of an optimal solution
 3. Compute the value of an optimal solution in a bottom-up fashion
 4. Construct an optimal solution from computed information



Thank You



Stay Safe

