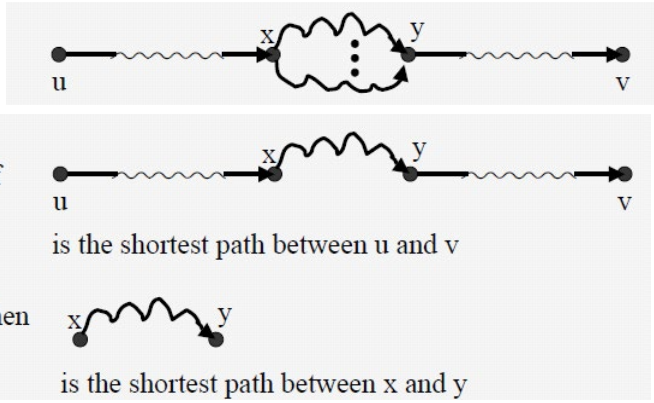
國立臺北大學自然資源與環境管理研究所
107 學年度第二學期『環境系統分析專題』

課程講義(05)：動態規劃與目標規劃
Dynamic Programming and Goal Programming

- INTRODUCTION TO DYNAMIC PROGRAMMING
  - □ Dynamic Programming = Divide and Conquer + Memoization
  - □ No Specific Forms or Formulations=> Principle of Optimality
  - □ Terminology: Stage, State, Decision, Return, Recursive Equation
  - □ Dynamic programming is a technique for solving problems with a recursive structure with the following characteristics:
    - ⇨ Optimal substructure (principle of optimality): An optimal solution to a problem can be decomposed into optimal solutions for sub-problems.
    - ⇨ A small number of sub-problems: The total number of sub-instances to be solved is small.
    - ⇨ Overlapping sub-problems: During the computation same instances are referred to over and over again.



  - □ An Example of Dynamic Programming: The Shortest Path Problem
    - ⇨ Backward vs. Forward

- GOAL PROGRAMMING
  - □ Criteria for Decision-Making: Attribute, Objective, Target, and Goal
    - ⇨ The UN SDGs: Goals, Targets, and Indicators
  - □ Multiple Criteria Decision Making: Multiple Attribute and Multiobjective
  - □ Classification of Goal Programming: Non-Preemptive vs. Preemptive
  - □ Non-Preemptive Goal Programming
    - ⇨ Complementary relationship
    - ⇨ One-sided vs. Two-sided
  - □ Preemptive Goal Programming or Lexicographic GP
  - □ Drawbacks: Normalization and Weighting; Pareto Optimality?
  - □ An Example of Goal Programming: Expansion of Production Lines