CSC2400 / Chapter 8 Homework

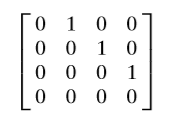
Due: Monday, April 20, 2020

**NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. **(6 points)** What does dynamic programming have in common with divide-and-conquer? What is a principal difference between them?
2. **(10 points)** Solve the instance **10, 25, 1, 1, 5, 1, 25, 10, 10** of the coin-row problem using the dynamic programming algorithm technique. Show the solution array and also the final output.
3. **(10 points)** Using the change making DP algorithm, give change for amount **8** using the minimum number of coins of denominations (**1, 2, 3, 4**). You may assume that there is an unlimited quantity of coins for each of the 4 denominations. Determine how many coins and also which coins will be used to make change.

1. Knapsack Problem.
   1. **(15 points)** Apply the bottom-up dynamic programming algorithm to the following instance of the knapsack problem:

* item 1, weight is 3 lbs, value is $25
* item 2, weight is 2 lbs, value is $20
* item 3, weight is 1 lb, value is $15
* item 4, weight is 4 lbs, value is $40
* item 5, weight is 5 lbs, value is $50
* **Capacity of knapsack is 6 lbs total**
  1. **(5 points)** What is the maximum value of a feasible subset of the knapsack   
     in part (a)?

1. **(15 points)** Apply Warshall’s algorithm to find the transitive closure of the digraph defined by the following adjacency matrix:  
   

**SCORE: \_\_\_\_\_\_ / 61**