Homework 4

Due Date: 7/31/16 11:59pm

1. Use the **dynamic programming technique** to find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is <8, 5, 10, 30, 20, 6>.

Matrix	Dimension
A1	8 * 5
A2	5*10
A3	10*30
A4	30*20
A5	20*6

   You may do this either by implementing the MATRIX-CHAIN-ORDER algorithm in the text or by simulating the algorithm by hand. In either case, show the dynamic programming tables at the end of the computation.

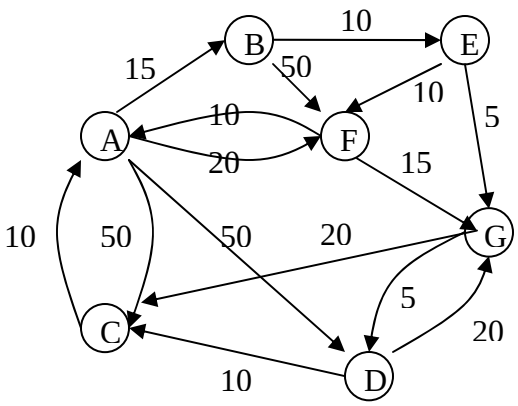
2. We have 5 objects, and the weights and values are

No.	1	2	3	4	5
w	10	20	30	40	50
v	20	30	66	60	55

The knapsack can carry a weight not exceeding 90, find a subset items and give the total weight and value for following algorithms:

1) By using the algorithm of greedy of value for 0-1 knapsack problem? By selecting the **highest** value first.
2) By using the algorithm of greedy of weight for 0-1 knapsack problem? By selecting **lightest** item first.
3) By using the algorithm of greedy of density for 0-1 knapsack problem? By selecting the highest **density** item first.
4) By using the algorithm of greedy of density for **fractional knapsack** problem? By selecting the highest density item first.

3. Using Floyd's algorithm (See Algorithm2 slide 54), calculate the length of the shortest path between each pair of nodes in the graph by constructing a matrix. Give the each step of the adjacency matrix.



Part II: programming exercise

Program Floyd's algorithm and use the graph of problem 3 in a driver program to test you answer.