CS 312: Algorithm Analysis- Homework Assignment #15

Show all work neatly.

Question 1: (4) Knapsack without repetition

Use dynamic programming to fill a knapsack without repetition having a maximum weight capacity of 10 units with a load of maximum value from the following objects:

Object	Weight	Value
A	1	1
B	2	7
C	5	11
D	6	21
E	7	31

Your answer should include:

- a table with solutions to sub-problems
- the value of the optimal load
- the objects to be included in the optimal load (show back-pointers in the table)

Question 2: (3) You are given five matrices with the following dimensions:

- M_1: 20 x 5
- M_2: 5 x 10
- M_3: 10 x 12
- M_4: 12 x 6
- M_5: 6 x 25

You wish to compute the product of the matrix chain $M_1\ M_2\ M_3\ M_4\ M_5$. What is the optimal (minimal) number of scalar multiplications required to compute this product? Use dynamic programming to compute the answer and show your work.

Question 3: (3) For the following graph, step through Floyd's algorithm (Floyd-Warshall), showing the **D** matrix at each step, and report the resulting shortest paths between all pairs of vertices.