

0. Read through Chapter 3 and Chapter 4 of the textbook.
1. Find the optimal order, and its cost, for evaluating the product $A_1 \times A_2 \times A_3 \times A_4 \times A_5$, where the size of each matrix are:

A_1 10 by 30.

A_2 30 by 2.

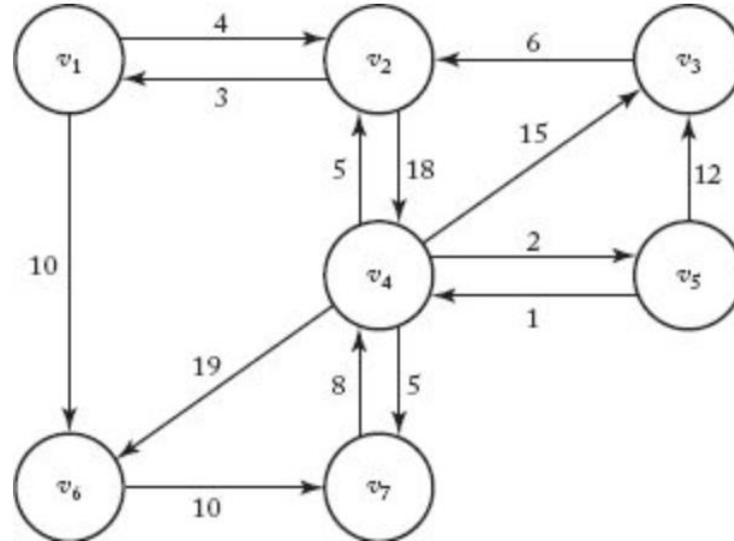
A_3 2 by 1000

A_4 1000 by 5

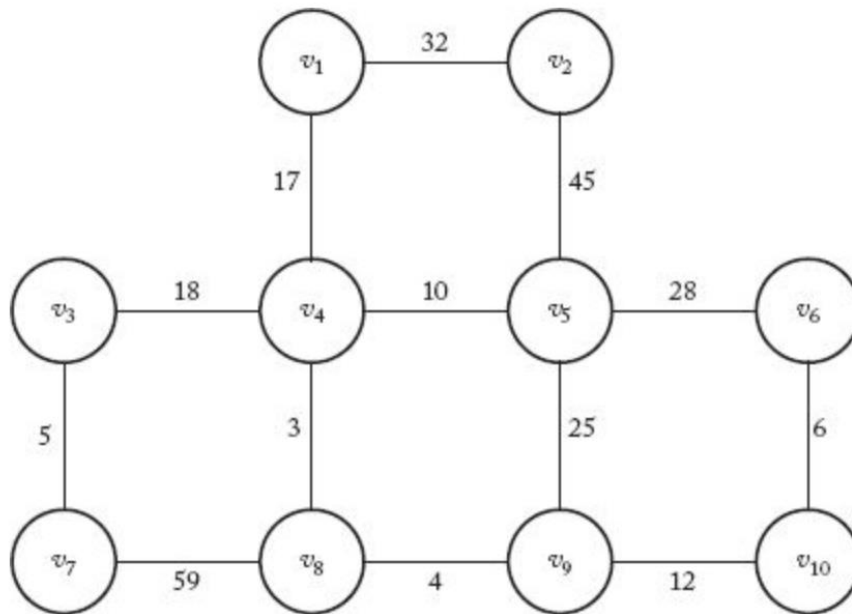
A_5 5 by 35.

Show the final matrices M and P produced by the Chain Matrix Multiplication algorithm we discussed in the class. Please provide the necessary details of how you obtain the result.

2. Use Floyd's algorithm for the Shortest Paths problem to construct the matrix D, which contains the lengths of the shortest paths, and the matrix P, which contains the highest indices of the intermediate vertices on the shortest paths, for the following graph. Show the actions step by step.



3. Find an optimization problem in which the principle of optimality does not apply and therefore that the optimal solution cannot be obtained using dynamic programming. Justify your answer. (Hint: If you can't come up with your own example, please read the chapter and describe an example in the chapter)



4. (a) Use Kruskal's algorithm to find a minimum spanning tree for the graph.
- (b) Use Dijkstra's algorithm to find the shortest paths from the vertex v_4 to all the other vertices of the graph. Show the actions step by step. Assume that each undirected edge represents two directed edges with the same weight.
5. Consider the following jobs, deadlines, and profits. Use the Scheduling with Deadlines algorithm to maximize the total profit.

<i>Job</i>	<i>Deadline</i>	<i>Profit</i>
1	2	40
2	4	15
3	3	60
4	2	20
5	3	10
6	1	45
7	1	55

6. Use Huffman's algorithm to construct an optimal binary prefix code for the letters in the following table.

Letter	:	c	e	i	r	s	t	x
Probability	:	0.11	0.22	0.16	0.12	0.15	0.10	0.14