

Homework 8

Problem 1:

The following is a tableau for a 0-1 knapsack problem. The items are given in the following table.

Item	Weight	Value	Item	Weight	Value
A	5	11	B	4	8
C	3	6	D	3	5
E	2	3	F	2	3
G	2	2			

Using this tableau, determine the solution to the zero-one knapsack problem for a total capacity of 16.

Capacity	{A}	{A,B}	{A,B,C}	{A,B,C,D}	{A,B,...,E}	{A,B,...,F}	{A,B,...,G}
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	0	3	3	3
3	0	0	6	6	6	6	6
4	0	8	8	8	8	8	8
5	11	11	11	11	11	11	11
6	11	11	11	11	11	11	11
7	11	11	14	14	14	14	14
8	11	11	17	17	17	17	17
9	11	19	19	19	19	19	19
10	11	19	19	19	20	20	20
11	11	19	19	22	22	22	22
12	11	19	25	25	25	25	25

13	11	19	25	25	25	25	25
14	11	19	25	25	28	28	28
15	11	19	25	30	30	30	30
16	11	19	25	30	30	31	31

Problem 2:

We are given items A with value 28 and weight 7, B with value 30 and weight 5, C with value 14 and weight 4, D with value 9 and weight 3, E with value 5 and weight 2 and F with weight 1 and value 2. The discrete (not the 0-1) knapsack problem gives the following tableau. Determine an optimal solution from the tableau.

Capacity	{A}	{A,B}	{A,B,C}	{A,B,C,D}	{A,B,...,E}	{A,B,...,F}
1	0	0	0	0	0	2
2	0	0	0	0	5	5
3	0	0	0	9	9	9
4	0	0	14	14	14	14
5	0	30	30	30	30	30
6	0	30	30	30	30	32
7	28	30	30	30	35	35
8	28	30	30	39	39	39
9	28	30	44	44	44	44
10	28	60	60	60	60	60
11	28	60	60	60	60	62
12	28	60	60	60	65	65
13	28	60	60	69	69	69
14	56	60	74	74	74	74
15	56	90	90	90	90	90
16	56	90	90	90	90	92

Problem 3:

We are given matrices of sizes 3×5 , 5×10 , 10×9 , 9×3 , 3×7 , 7×10 . Determine the best way to calculate the product of these matrices such that the number of multiplications is minimized.