

Question - 1

- a) I found maximum profit using dynamic programming algorithm. I divide the problem into overlapping subproblems and kept the results from these subproblems in array and get the most suitable solution.

Complexity Analyze

$$\sum_{i=1}^{\text{size}=n} 1 = 1+2+\dots+n \in \Theta(n) \rightarrow T(n) = \Theta(n)$$

- b) In homework 3 we have same problem but we didn't use dynamic programming algorithm. We used an algorithm similar to brute force. So;

Homework-3 time complexity was $\Theta(n^2)$

Dynamic programming algorithm time complexity is $\Theta(n)$

But this time we have another array to keep results and this gives us a space complexity.

Question - 2

I associate the problem to the knapsack problem because we have weight and price in the knapsack problem and at the same time we are trying to fill knapsack using capacity. In candy problem we have length and price and we are trying to get maximum price with length capacity. So they look similar to me and I wrote the algorithm by looking the example covered in the lesson.

Complexity Analyze

$$T(n) = \sum_{i=0}^{n-1} \sum_{j=0}^{m-1} 1 \rightarrow \Theta(n * m)$$

$T(n) \in \Theta(n * m)$

n = size of price m = size of current price and results

Question - 3)

My idea for this problem is to calculate the ratio cheese price/weight for each item and sort them on bases of this ratio for greedy algorithm. Then take items from the highest to lowest and add them as much as I can without exceeding the box weight capacity.

Complexity Analyze

$$T(n) = \sum_{i=0}^n 1 + \sum_{i=0}^n 1 \rightarrow \text{all price}$$

$$T(n) \in \Theta(n)$$

Question - 4)

It is a selection problem and we have to adjust the maximum number of courses to be completed. I use 3 array. One array for course indexes, one array for start time and other finish time. I send array time sorted and its reduce complexity time. Also I think there is wrong answer {English, Mathematics, Chemistry, Geography} because Chemistry start at 5, end at 7 so we can not take course Geography after Chemistry because it starts at 5 again. We can take Biology after Chemistry because it starts at 8. So result is {English, Mathematics, Chemistry, Biology}

Complexity Analyze

$$\sum_{i=1}^{\text{len}} 1 \in \Theta(n) \rightarrow T(n) \in \Theta(n)$$