CS 758/858: Algorithms

DP	http://www.cs.unh.edu/~ruml/cs758	
More DP		

DP

■ Counting

■ 0-1 Knapsack

- Time Complexity
- Break

More DP

DP

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Counting

DP
Counting
■ 0-1 Knapsack
■ Time Complexity
Break
More DP

You are late for a meeting that is held on the floor above your current location. You can climb the staircase one step at a time, two steps at a time, or, with great effort, three steps at a time. As you are rushing upstairs, the increased bloodflow to your brain (combined with the adrenaline from being late) gives you a sudden flash of insight into how to count the number of ways of climbing a staircase of n steps. What is the algorithm?

0-1 Knapsack

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0-1 Knapsack
Time Complexity
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Given n objects with integer weights w_i and values v_i , what is the most valuable subset that weighs at most W?

0-1 Knapsack

DP
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Given n objects with integer weights w_i and values v_i , what is the most valuable subset that weighs at most W?

Give an algorithm that runs in O(nW) time.

0-1 Knapsack

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Will greedy work? What if items can be divided?

Time Complexity

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what is the length of the input?

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what is the length of the input?

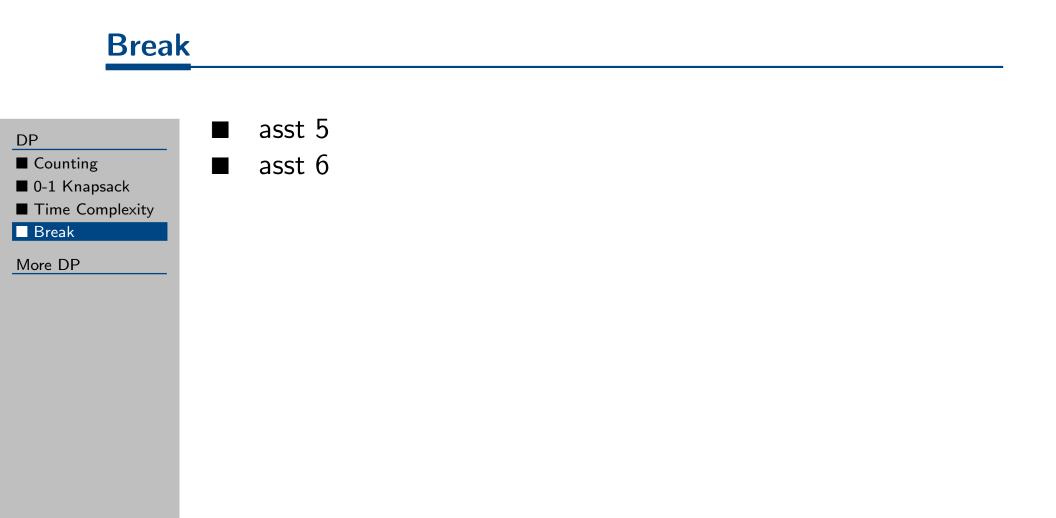
pseudo-polynomial time: polynomial if the magnitude of the input numbers is polynomial in the input size.

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what is the length of the input?

pseudo-polynomial time: polynomial if the magnitude of the input numbers is polynomial in the input size.

Does this apply to radix sort?



DP

More DP

- Increasing Subseq
- EOLQs

More DP

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DP
More DP
Increasing Subsection
■ EOLQs

Given a sequence of length n consisting of numbers, give an $O(n^2)$ algorithm that finds the longest (not necessarily contiguous) subsequence that consists of monotonically increasing values.

More DP
Increasing Subseq
EOLQs

Given a sequence of length n consisting of numbers, give an $O(n^2)$ algorithm that finds the longest (not necessarily contiguous) subsequence that consists of monotonically increasing values.

BTW, there is an $O(n \lg n)$ algorithm

DP

More DP
Increasing Subseq
EOLQs

For example:

- What's still confusing?
- What question didn't you get to ask today?
- What would you like to hear more about?

Please write down your most pressing question about algorithms and put it in the box on your way out. *Thanks!*