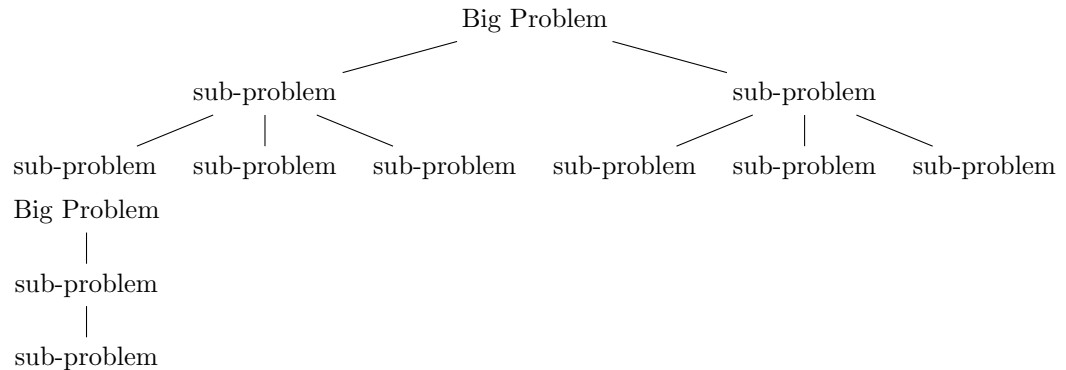


What's the similarity and difference of DP and Greedy?

DP	Greedy
Used to solve optimizaiton	Used to solve optimization
Have optimal substructure	Have optimal substructure
Make an 'informed choice' after getting optimal solutions to subproblems	Make a 'greedy choice' before solving the subproblem
Bottom-up	Top-down
Dependent or overlapping subproblems	Each round selects only one subproblem
	The subproblem size decreases
	No overlapping subproblem



Greedy Choice Property

Show that it exists an optimal solution that 'contains' the greedy choice using the '*exchange argument*'

For any optimal solution OPT, the greedy choice g has two cases:

1. g is in OPT
2. g is not in OPT: modify OPT into OPT' s.t. OPT' contains g and is at least as good as OPT

Knapsack Substructure

$$c[i, w] = \begin{cases} 0 & \text{if } i = 0 \text{ or } w = 0, \\ c[i - 1, w] & \text{if } w_i > w, \\ \max(v_i + c[i - 1, w - w_i], c[i - 1, w]) & \text{if } i > 0 \text{ and } w \geq w_i \end{cases}$$