

Tutorial 5 Solutions

①

Q1: Greedy algorithm of fractional knapsack problem cannot give optimal solution of 0-1 knapsack problem.

Consider the following, instance of 0-1 knapsack problem, with only two items I_1 and I_2 .

Size of $I_1 = 1$, Size of $I_2 = W$
profit of $I_1 = 1$, profit of $I_2 = W-1$

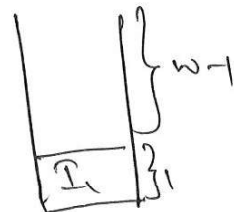
Let the Bag size is W .

~~Fractional~~
Apply Greedy algo. of fractional knapsack problem to 0-1 knapsack

- pick the items into the bag in the order of non-increasing scores = profit/size.

	I_1	I_2
Size	1	W
profit	1	$W-1$
Score = profit/size	1	$\frac{W-1}{W} < 1$

\Rightarrow So pick I_1 into bag



Now I_2 cannot pick into the bag,

So, greedy returns $\{I_1\}$ as the solution, with profit 1.

But, optimal solution is $\{I_2\}$ with profit $W-1$.
the profit of optimal solution $>$ profit of greedy
for all $W > 2$.

Q2:

Frog should ~~jump~~ ^{always take the} maximum possible jump.
