

Discrete Optimization

The Knapsack Problem:
Greedy Algorithms Intuition

Goals of the Lecture

- ▶ Introduce greedy algorithms
 - What would Indiana Jones do?

The Temple is Collapsing



\$1 Million
2kg



\$1 Million
2kg



\$1 Million
2kg



\$10 Million
5kg



\$10 Million
5kg



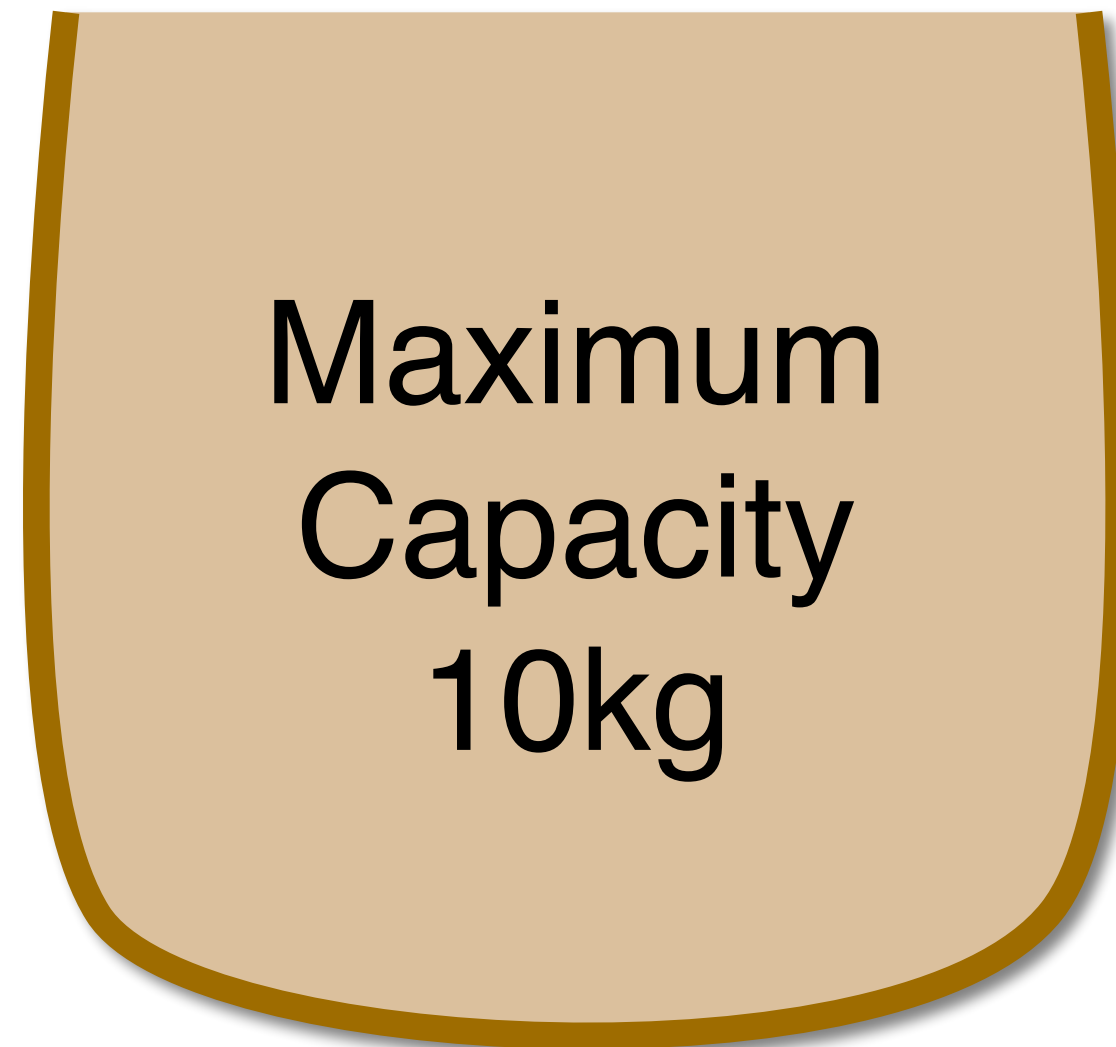
\$14 Million

can we
do better?

\$13 Million
8kg



\$7 Million
3kg



Maximum
Capacity
10kg

Greedy Algorithms

- ▶ Idea: “Take the most valuable items first”
 - greedy algorithm
- ▶ For one problem, there are many possible greedy algorithms.
 - some will do better than others

Until Next Time

Citations

Stone Foundation Tablet with Inscription of Gudea - 41221 ([http://commons.wikimedia.org/wiki/File:Sumerian _-
_Stone_Foundation_Tablet_with_Inscription_of_Gudea_-_Walters_41221_-_View_A.jpg](http://commons.wikimedia.org/wiki/File:Sumerian_-_Stone_Foundation_Tablet_with_Inscription_of_Gudea_-_Walters_41221_-_View_A.jpg)). Artist Unknown. Walters Art Museum [Public domain, CC-BY-SA-3.0 (<http://creativecommons.org/licenses/by-sa/3.0>)], via Wikimedia Commons

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Stone_Foundation_Tablet_with_an_Inscription_of_Gudea_-_Walters_41220_-_View_A.jpg](http://commons.wikimedia.org/wiki/File:Sumerian_-_Stone_Foundation_Tablet_with_an_Inscription_of_Gudea_-_Walters_41220_-_View_A.jpg)). Artist Unknown. Walters Art Museum [Public domain, CC-BY-SA-3.0 (<http://creativecommons.org/licenses/by-sa/3.0>) via Wikimedia Commons

Ring with the engraved portrait of Ptolemy VI Philometor ([http://commons.wikimedia.org/wiki/File:Ring_with_engraved_portrait_of_Ptolemy_VI_Philometor_\(3rd
%E2%80%93_2nd_century_BCE\)_-_2009.jpg](http://commons.wikimedia.org/wiki/File:Ring_with_engraved_portrait_of_Ptolemy_VI_Philometor_(3rd_%E2%80%93_2nd_century_BCE)_-_2009.jpg)<[http://commons.wikimedia.org/wiki/File:Ring_with_engraved_
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