

Greedy Algorithms: Review

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Algorithmic Toolbox
Data Structures and Algorithms

Main Ingredients

- Safe move
- Prove safety
- Solve subproblem
- Estimate running time

Safe Moves

- Put max digit first
- Refill at the farthest reachable gas station
- Cover leftmost point
- Use item with maximum value per unit of weight

Optimization

- Assume everything is somehow sorted
- Which sort order is convenient?
- Greedy move can be faster after sorting

General Strategy

Problem

General Strategy

Problem $\xrightarrow{\text{greedy choice}}$

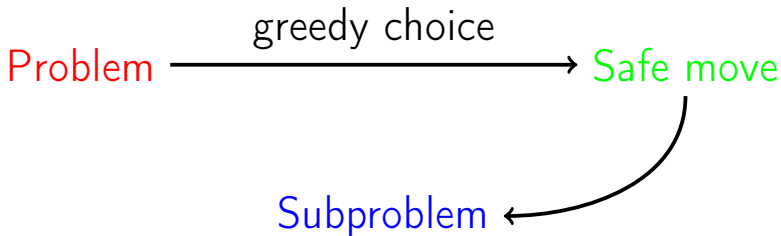
- Make a greedy choice

General Strategy

Problem $\xrightarrow{\text{greedy choice}}$ Safe move

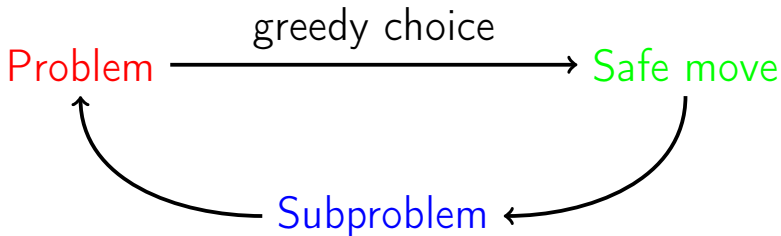
- Make a greedy choice
- Prove that it is a safe move

General Strategy



- Make a greedy choice
- **Prove** that it is a **safe move**
- Reduce to a **subproblem**

General Strategy



- Make a greedy choice
- **Prove** that it is a **safe move**
- Reduce to a **subproblem**
- Solve the **subproblem**