

For Wednesday

- Read chapter 10, section 2
- Take home due

Research Paper

- Any questions?

Program 4

- Any questions?

Optimization Problems

- In many problems, there are two types of solutions
 - feasible solutions
 - optimal solutions
- These types of problems are called optimization problems

Applying Algorithms to Optimization Problems

- When applying an algorithm design method to a problem, we may get
 - an unacceptable solution
 - a feasible solution that is clearly not optimal
 - a feasible solution that is close to optimal
 - an optimal solution

Optimization Problem Examples

- Job Scheduling
- Loading
- Minimum Spanning Tree
- Traveling Salesman

Greedy Algorithms

- With the greedy method, at each step of the algorithm we make the decision that appears best at that time.
- We must always define a **greedy criterion** that determines the best decision.
- Decisions are never changed.
- Each decision must take feasibility of the final solution into account.

Making Change

Examples

- Making Change
- Shortest Path
- Topological Sort
- Minimum Spanning Tree
- Job Scheduling
- Huffman Code
- Bin Packing

Job Scheduling

- What's the problem?
- What is an optimal solution?
- Can we achieve an optimal solution using a greedy algorithm?

Greedy Heuristic

- Assume we want to minimize average completion time: how can we do that?
- Assume we want to minimize final completion time. How would we do that?

Huffman Codes

- File compression technique
- Greedy algorithm is optimal

Bin Packing

- What's the problem?

On-Line Strategies

- Next Fit
- First Fit
- Best Fit

Off-Line Strategies

- First Fit Decreasing
- Best Fit Decreasing