Lecture 28: Friday November 16, 2001

today

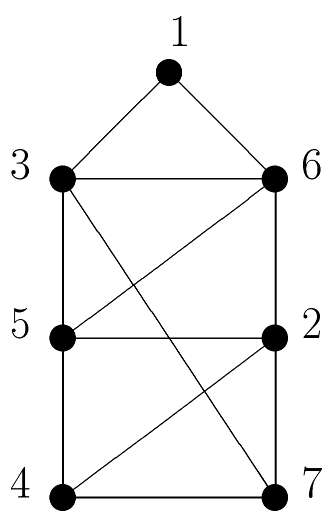
- muddytown

announcements

- Assignment 7 due Monday November 19

muddytown

- problem: dirt streets, muddy when it rains
- goal: to be able to walk without muddying shoes
- idea: pave enough streets to walk anywhere
- problem: given street paving costs, find min cost paving




```
1: 3 6
2: 4 5 6 7
3: 1 5 6 7
4: 2 5 7
5: 2 3 4 6
6: 1 2 3 5
7: 2 3 4
```

	1	2	3	4	5	6	7
1							
2							
3							
4							
5							
6							
7							

muddytown = minimum spanning tree [CLRS Ch. 23]

- acyclic graph: no cycles
- tree: connected acyclic graph
- weighted graph: graph together with edge weights (or costs)
- spanning subgraph: includes all vertices of the graph
- spanning tree: spanning subgraph which is a tree
- MST problem: given weighted connected graph,
  find minimum weight spanning tree of the graph
- MSF problem: given weighted graph,
  for each component, find MST of the component

greedy algorithms

- greedy: each step makes best choice (locally optimum)
- in general, greedy solution may not be globally optimum
- for MST problem, two greedy solutions **are** globally optimum

two greedy MST algorithms

- Prim/Dijkstra(/Boruvka)

```
tree <- any vertex
do n-1 times
  add min cost edge which grows tree
```

- Kruskal(/Boruvka)

```
forest <- all vertices, no edges
do n-1 times
  add min cost edge which grows forest
```

- correctness uses graph theory
- different complexities, depend on imp'n