

## Greedy Algorithms Practice

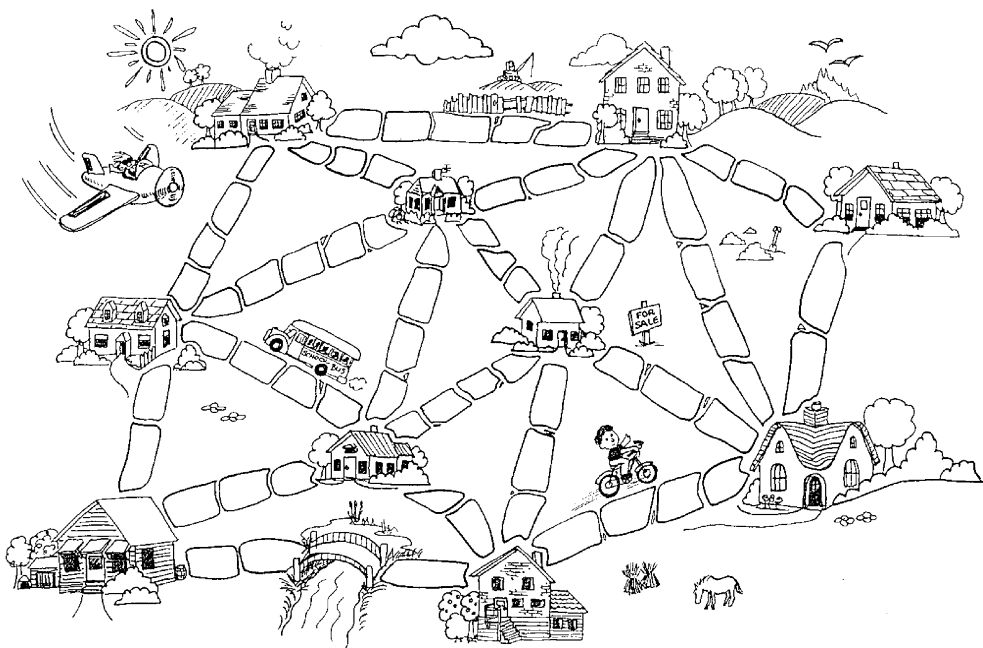
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### The Muddy City Problem

Once upon a time there was a city that had no roads. Getting around the city was particularly difficult after rainstorms because the ground became very muddy—cars got stuck in the mud and people got their boots dirty. The mayor of the city decided that some of the streets must be paved, but didn't want to spend more money than necessary because the city also wanted to build a swimming pool. The mayor therefore specified two conditions:

1. Enough streets must be paved so that it was possible for everyone to travel from their house to anyone else's house by a route consisting only of paved roads, possibly via other houses, and
2. the paving should be accomplished at a minimum total cost.

Here is the layout of the city.



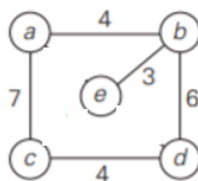
## Spanning Trees

Given a graph, a subgraph is a *tree* if:

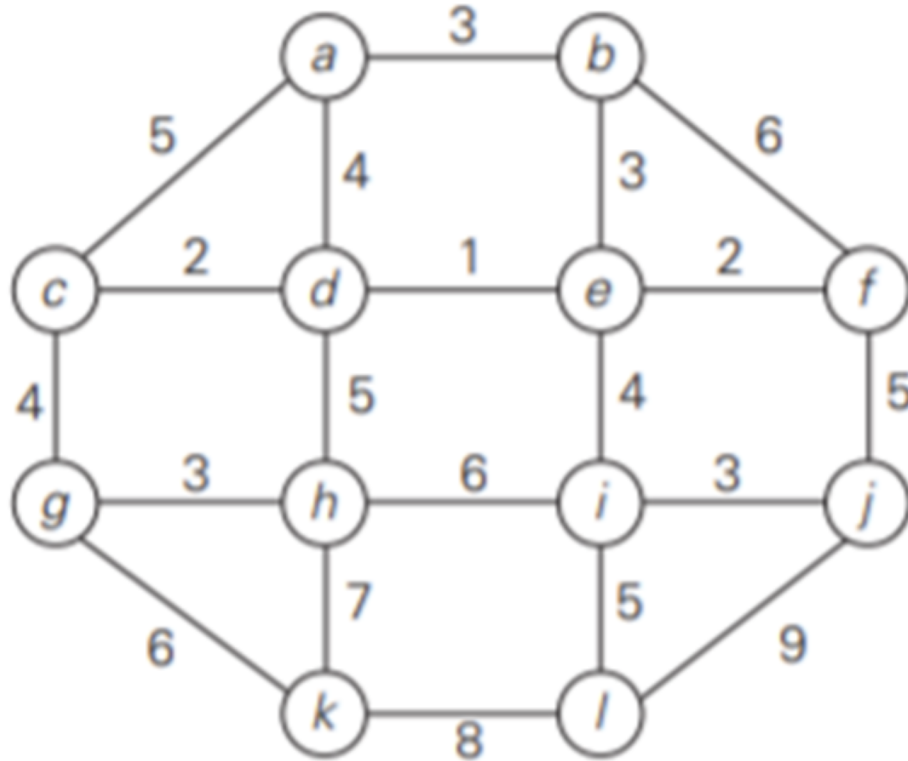
A subgraph is a *spanning tree* if:

A subgraph is a *minimum spanning tree* if:

Draw all spanning trees of the graph below. Circle any that are also minimum spanning trees.



Apply Prim's algorithm to the graph below. List the edges of the graph that Prim's algorithm determines are in the minimum spanning tree. List them in the order in which they are added to the MST when vertex *a* is where the algorithm begins. (This problem is from your textbook.)



Apply Kruskal's algorithm to the graph below. List the edges of the graph that Kruskal's algorithm determines are in the minimum spanning tree. List them in the order in which they are added to the MST. (This problem is from your textbook.)

