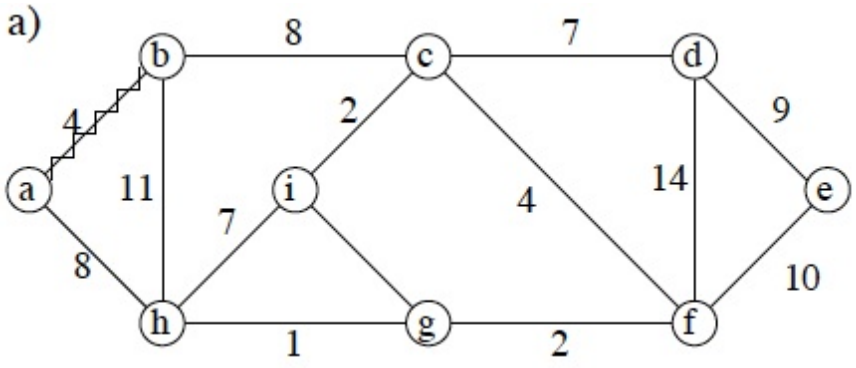
Algorithms Lab 10

In lab



1. Show how Prim's and Kruskal's algorithms run on an example graph.
2. Prim's:
   - What is the role of checking whether $v \in PQ$?
   - How many INSERT operations are performed by the algorithm?
   - How many DELETE-MIN operations are performed by the algorithm?
   - Assuming the priority is implemented as a heap, what is the complexity of the algorithm?
   - Consider a vertex v that's not yet in the tree. Note that there may exist several edges that connect v to a vertex in T; the smallest one of these edges will come out of the queue and will be added to the tree, and the rest of them will be discarded. Can you think of a way to improve Prim's algorithm to store only the smallest one of these edges in the priority queue? What is the benefit of this idea?
3. Kruskal's algorithm: Come up with a data structure that can hadle sets in the way needed by Kruskal's algorithm.

Homework

1. (CLRS 23.1-1) Show that a minimum-weight edge in G belongs to some MST of G.
2. (CLRS 24.2-4) Suppose that all edge weights in a graph are integers in the range from 1 to $|V|$. How can you take advantage of this in Kruskal's algorithm, and how fast can you make it run? What if the edge weights are integers from 1 to W for some constant W?