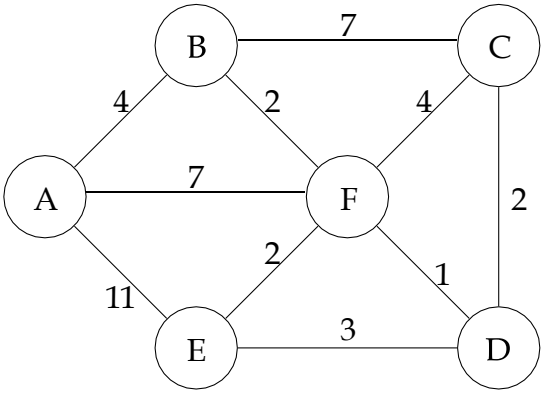
Data Structures and Algorithms

Exercises Week 10

1. Explain the logic by which, at each node, Dijkstra's shortest path algorithm is able to use information only from the edges incident to that node in order to discover the shortest path from the start node to one of the neighbours of the current node.
2. What restriction on the edge weights must be assumed for Dijkstra's algorithm to work? What could be the consequence if that assumption were false?
3. Explain the purpose of a (modified) priority queue in the operation of Dijkstra's algorithm and what is the additional method, i.e. additional to the usual priority queue ADT.
4. Apply Dijkstra's algorithm to the weighted graph below, starting from node A. Show each step and, at each step, the calculation and the two sets of nodes and distances; one set for which shortest distances have been determined and the other set of the remaining nodes and distances.



5. Work through the section on Single Source Shortest Paths on VISUALGO https://visualgo.net/en/sssp.