13.2. In the network shown in Figure 13.14, the bold lines represent a minimum spanning tree.

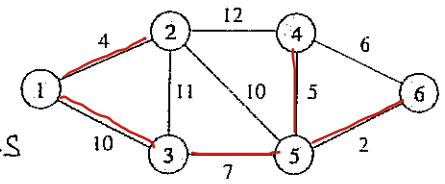

Figure 13.14 Verifying cut and path optimality conditions.

(a) By listing each nontree arc (k, l) and the ~~minimum~~ maximum length arc on the tree path from node k to node l, verify that this tree satisfies the path optimality conditions.

(b) By listing each tree arc (i, j) and the minimum length arc in the cut defined by the arc (i, j), verify that the tree satisfies the cut optimality conditions.

13.3. Using Kruskal's algorithm, find minimum spanning trees of the graphs shown in Figure 13.15.

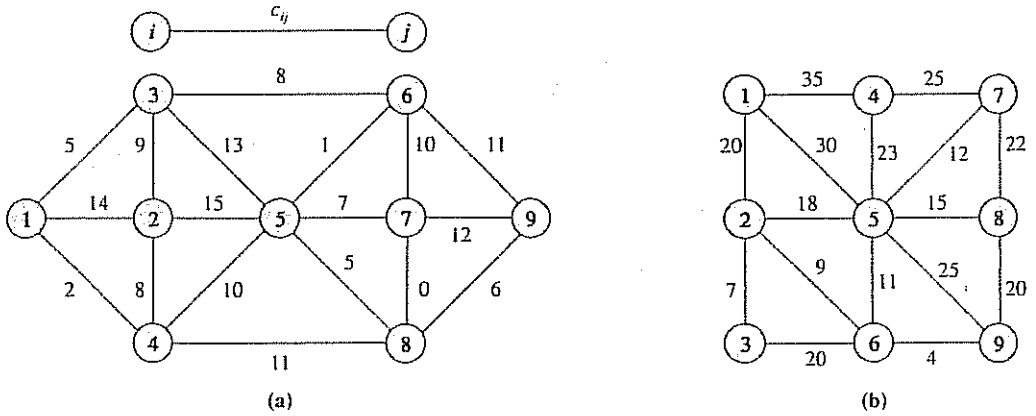

Figure 13.15 Examples for Exercises 13.3 to 13.5.

13.4. Using Prim's algorithm, find minimum spanning trees of the graphs shown in Figure 13.15.

13.5. Using Sollin's algorithm, find minimum spanning trees of the graphs shown in Figure 13.15.

13.6. Think of the network shown in Figure 13.16 as a highway map, and the number recorded next to each arc as the maximum elevation encountered in traversing the arc. A traveler plans to drive from node 1 to node 12 on this highway. This traveler dislikes high altitudes and so would like to find a path connecting node 1 to node 12

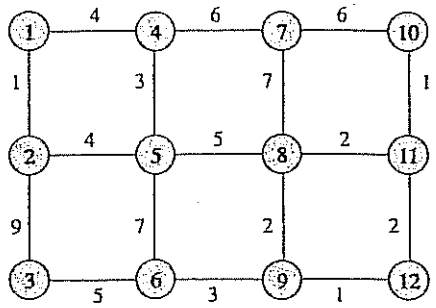

Figure 13.16 Highway grid.

that minimizes the maximum altitude. Find the best path for this traveler using a minimum spanning tree algorithm.