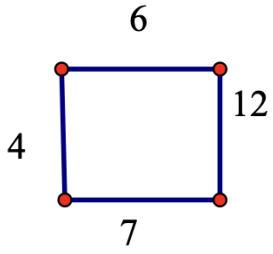
Section 1.4 Networks and Spanning Trees-continued

Minimum Cost Spanning Tree(MCST)

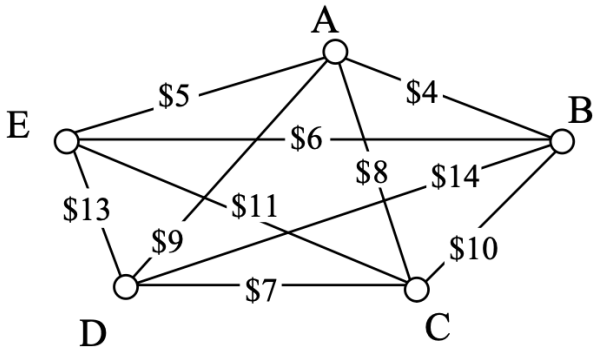
Example 1. Consider the following weighted graph. Find the minimum spanning tree.



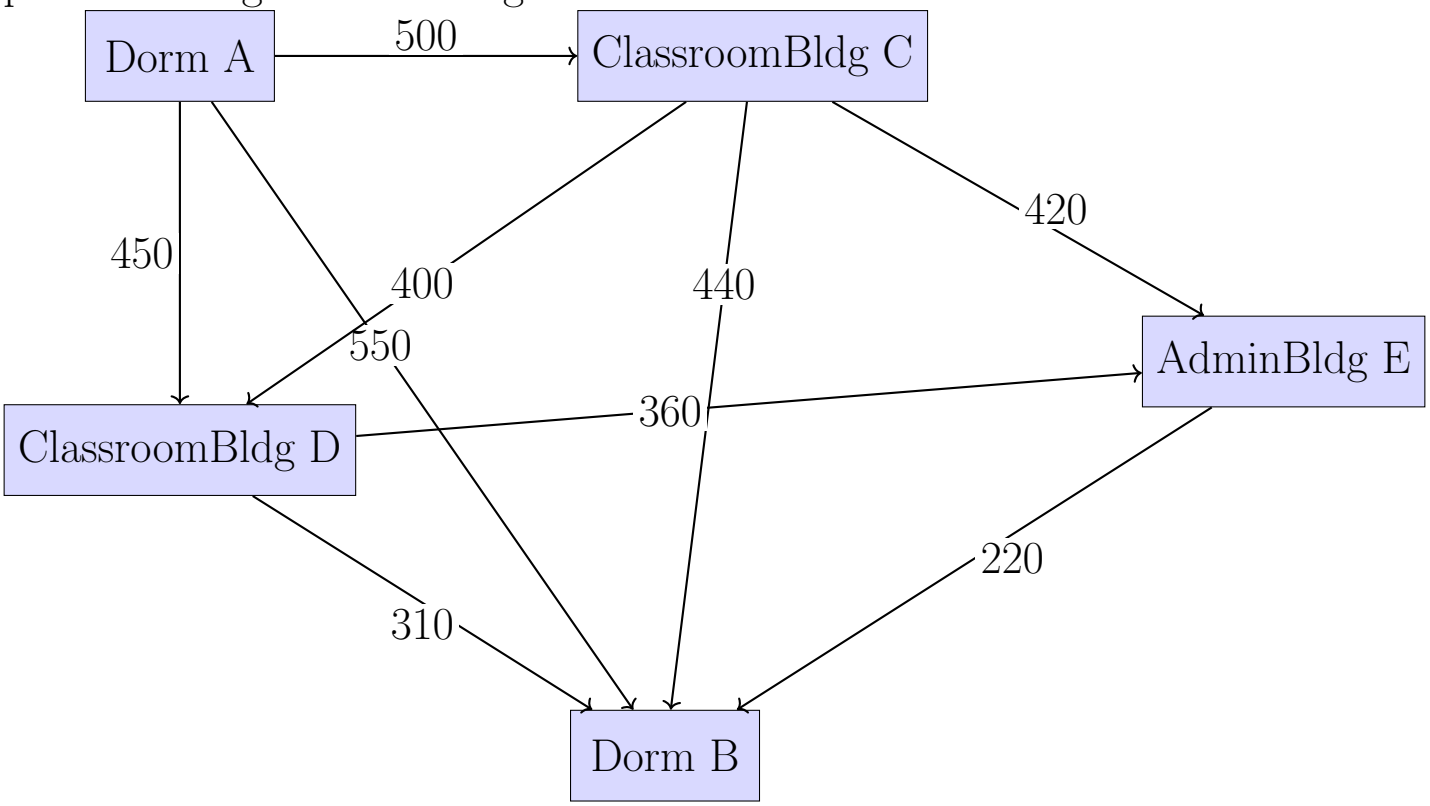
Kruskal's Algorithm to find the Minimum Spanning Tree for a network with N vertices:

1. Find the cheapest edge and mark it as part of you MST. (maybe highlight it in the graph)
2. Find the next cheapest unmarked edge, such that we can add it to our MST without producing a circuit.
3. Repeat until all vertices are linked in a tree and **Stop** when you have $N-1$ edges

Example 2. Find the Minimum Spanning Tree using Kruskal's Algorithm.



Example 3. Find the Minimum Spanning Tree for the Cold Region problem using Kruskal's Algorithm



Example 4. The Amazonian Cable Network The Amazonia Telephone Company is contracted to provide telephone, cable, and Internet service to the seven small mining towns shown in Fig. 7-15(a). These towns are located deep in the heart of the Amazon jungle, which makes the project particularly difficult and expensive. In this environment the most practical and environmentally friendly option is to create a network of underground fiber-optic cable lines connecting the towns. In addition, it makes sense to bury the underground cable lines along the already existing roads connecting the towns. The existing network of roads is shown in Fig. 7-15(a). Figure 7-15(b) is a network model of all the possible connections between the towns. The vertices of the network represent the towns, the edges represent the existing roads, and the weight of each edge represents the cost (in millions of dollars) of creating a fiber-optic cable connection along that particular edge. What is the optimal fiber optic cable network connecting the seven towns?

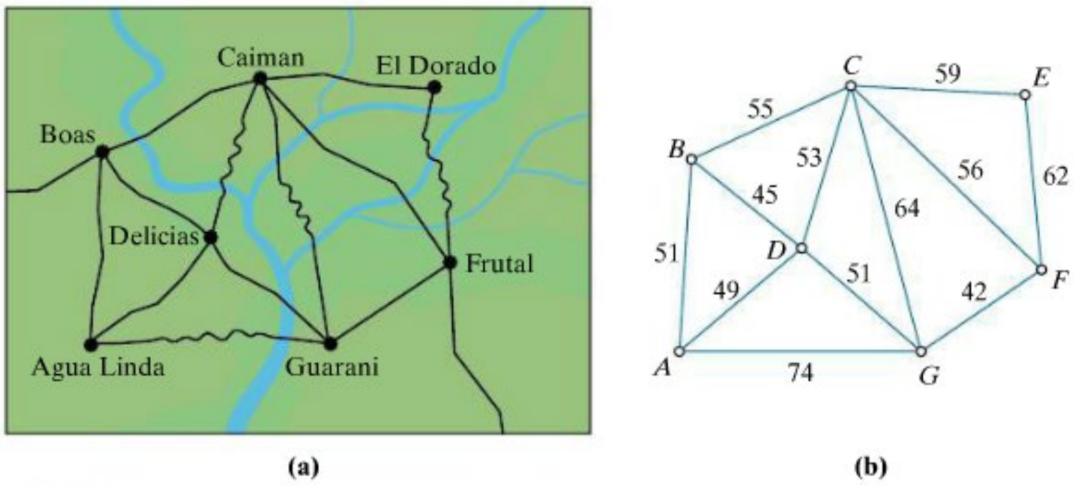


FIGURE 7-15 (a) Network of roads connecting seven towns. (b) Network model showing the cost (in millions) of each connection.