15.4 – Trees

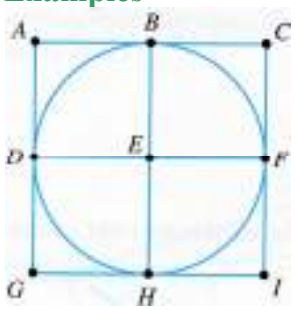
Telecommunications or computer networks do not need circuits. The devices are typically connected to the network with one cable. A weighted graph may be used where the weights on the edges represent the cost of cables to the devices (vertices) from different directions.

Subgraph – A subset of a graph.

Tree – A subgraph that is connected and contains no circuits.

Spanning Tree – A tree that contains all vertices of the graph.

Examples

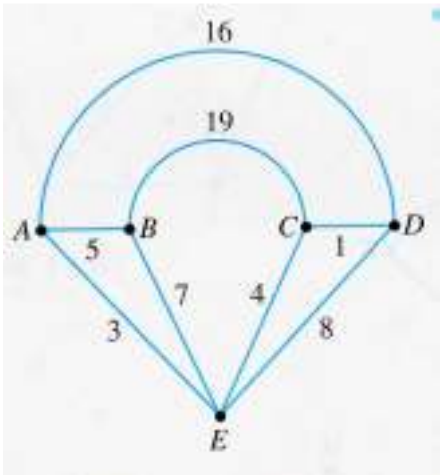


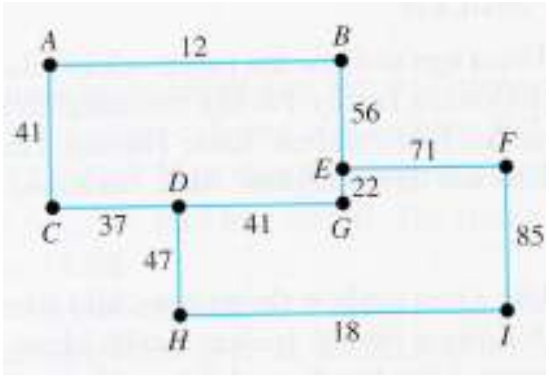
Minimum Spanning Tree – A spanning tree with the minimum sum of weights.

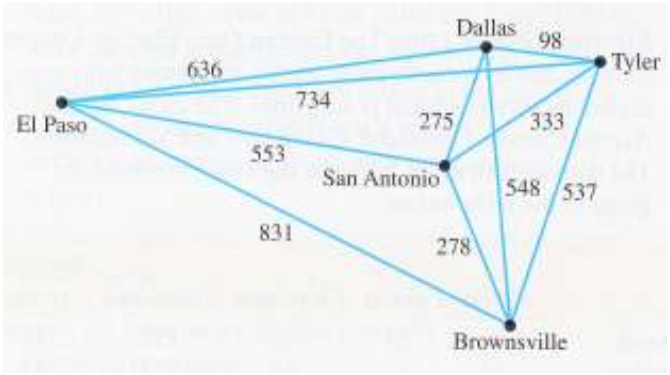
Kruskal's Algorithm

1. Choose the edge with the lowest cost on the graph.
2. Choose the next lowest cost edge that does not form a circuit.
3. Continue step #2 until all vertices are part of the tree.

Examples







	Champaign	Chicago	Peoria	Rock-ford	Spring-field
Champaign	*	135	89	181	86
Chicago	135	*	170	85	202
Peoria	89	170	*	129	74
Rockford	181	85	129	*	193
Springfield	86	202	74	193	*