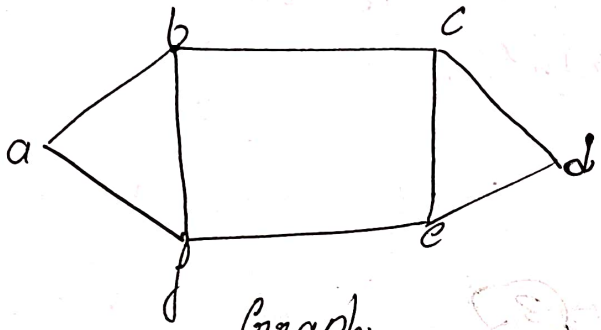
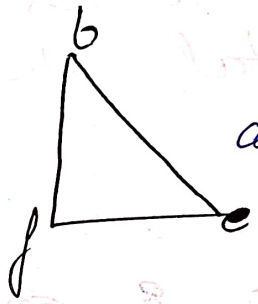
Spanning Tree

A tree T is said to be spanning tree of a connected graph G. if T is a subgraph of G and T contains all vertices of G.

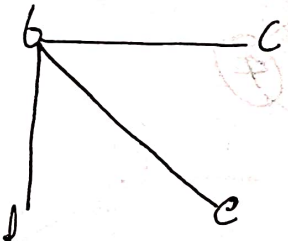


Graph



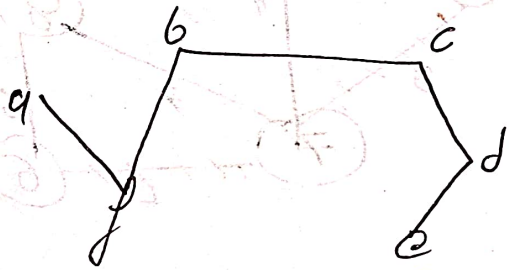
connected but cyclic

Spanning tree ×



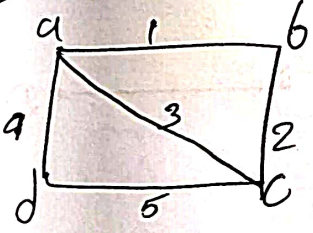
all vertices are not there

so not spanning tree

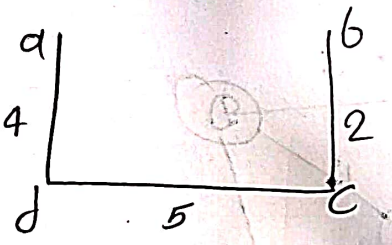


Spanning Tree

Ex →



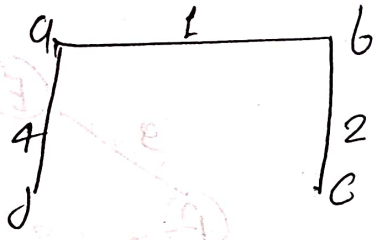
Graph



cost →

4 + 5 + 2 = 11

Spanning tree



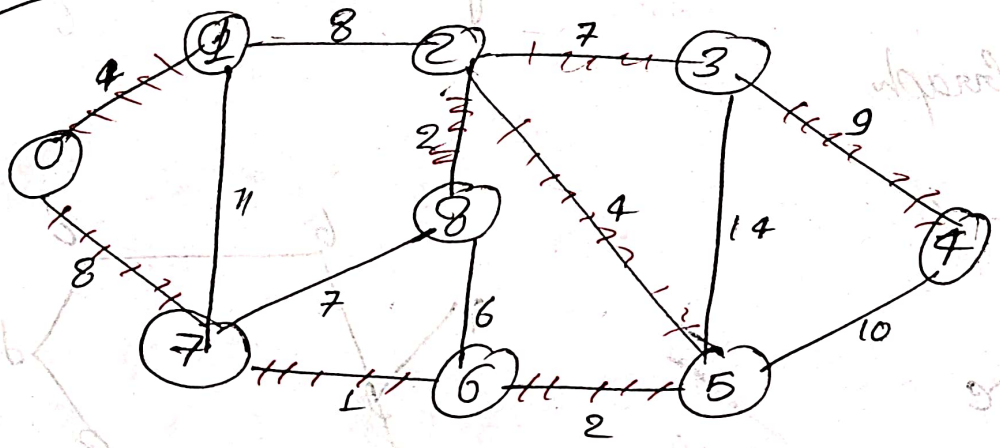
cost = 4 + 1 + 2

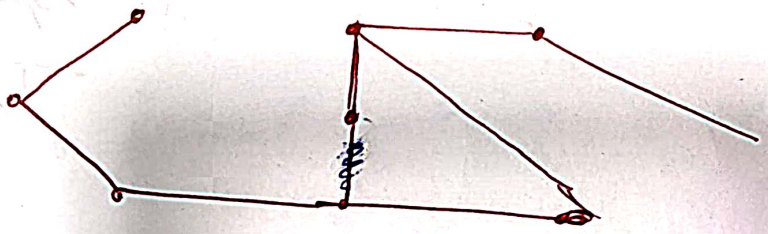
mini spanning tree

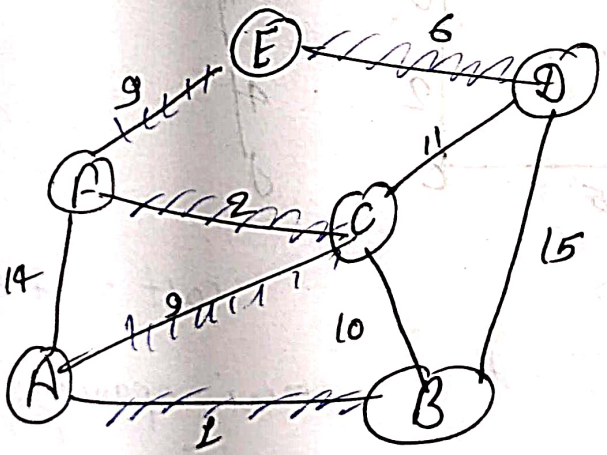
Minimum Spanning Tree

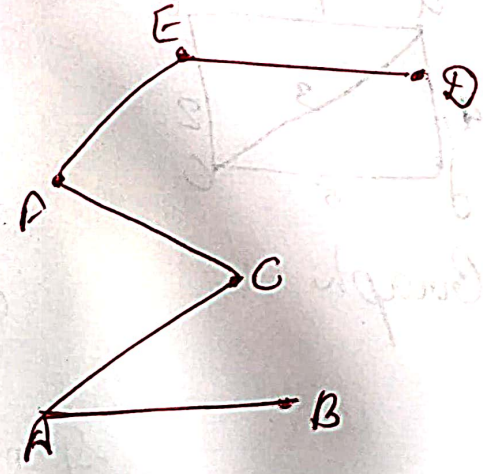
A minimum spanning tree or minimum weight spanning tree is a subset of the edges of a connected, edge-weight undirected graph that connects all vertices together, and with minimum possible total edge weight.

Eg →





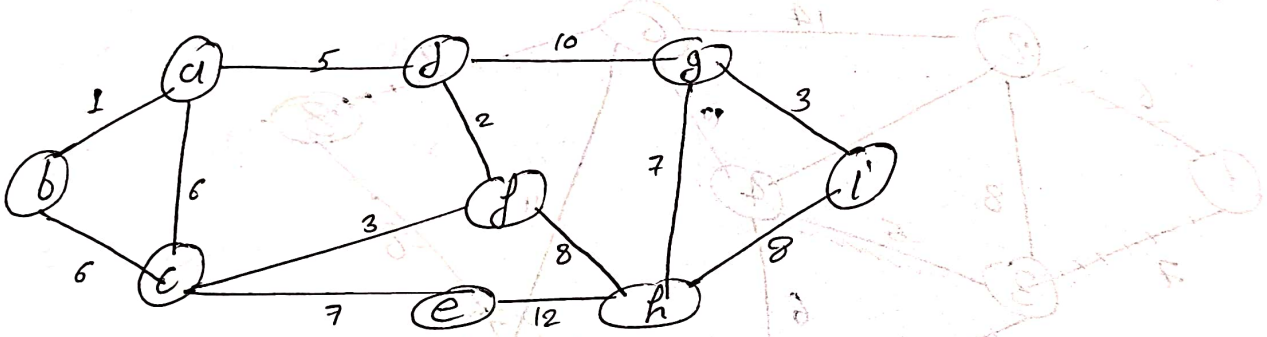




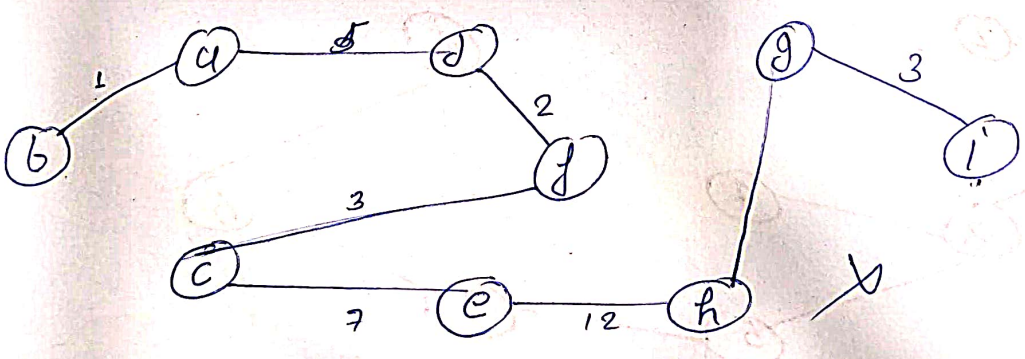
Prim's Algorithm (used to find minimum cost spanning tree)

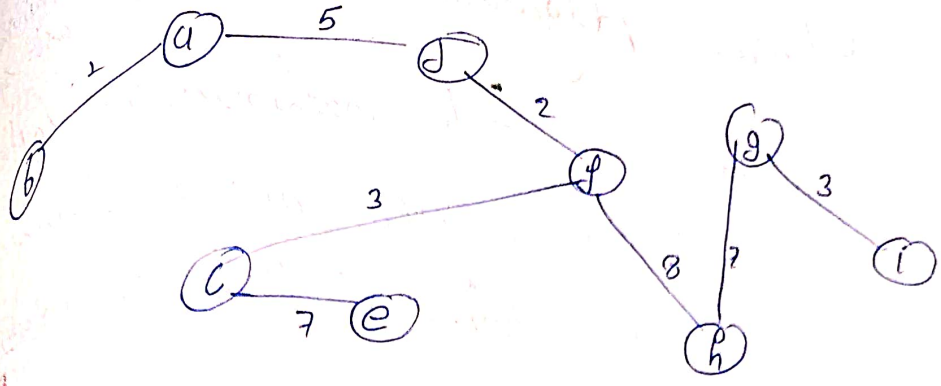
Developed in 1930 by Czech mathematician Voytech Jarnik. And later re-discovered and republished by computer scientists Robert C. Prim in 1957. And Edsger W. Dijkstra in 1959.

→ It is also sometimes called the Jarnik's algorithm, Prim - Jarnik algorithm, Prim - Dijkstra algorithm or DJP algo.



start with b →

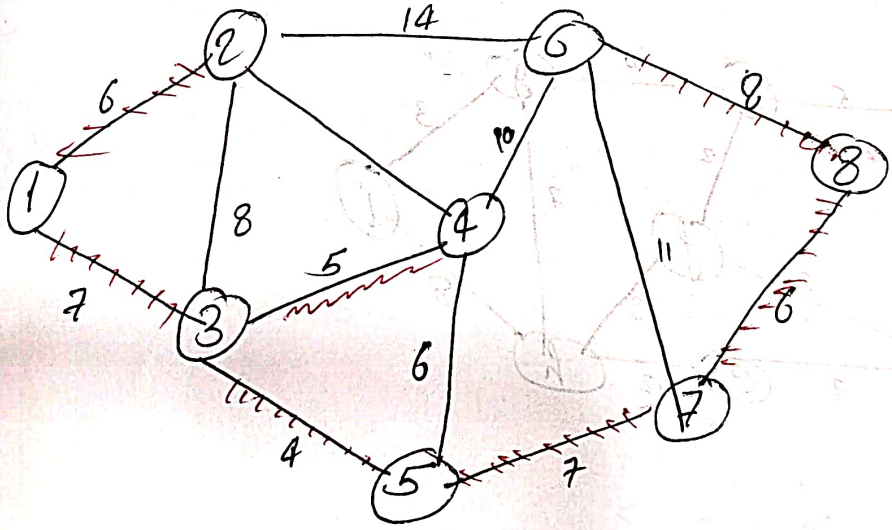


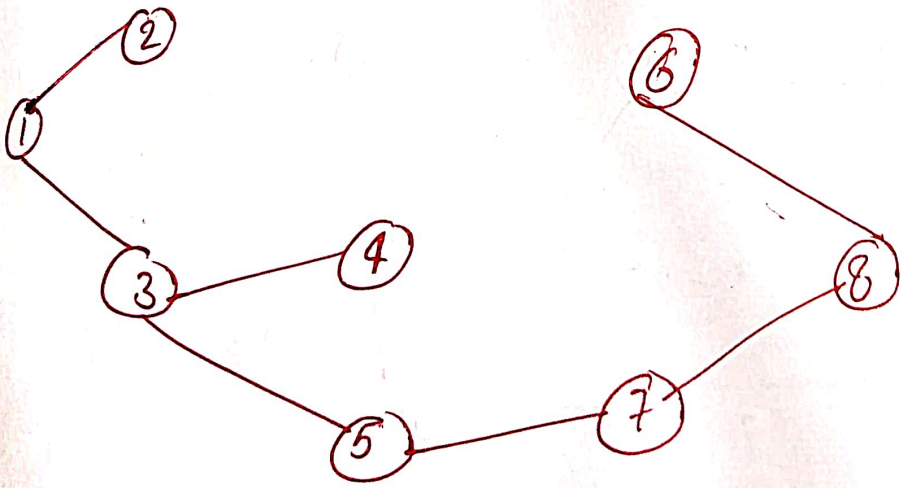


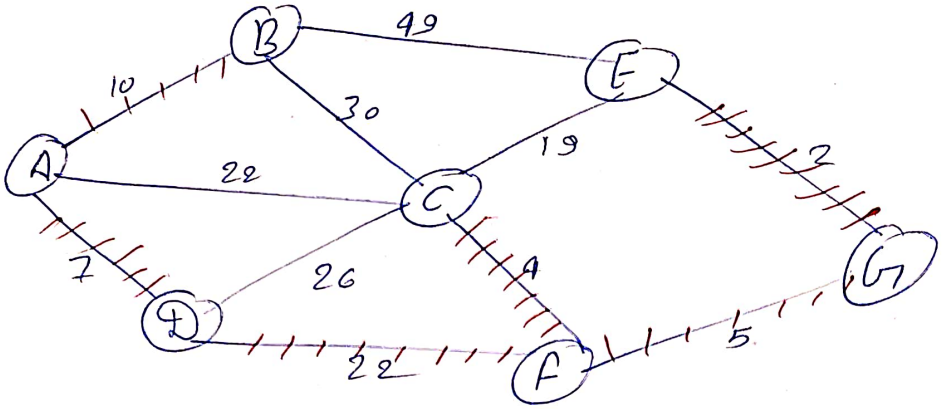
Total cost ⟹ 1+5+2+3+7+8+7+3

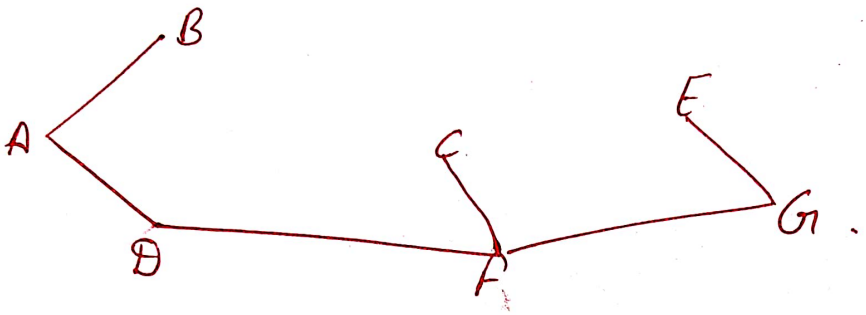
⟹ 36

Kruskal Algo









(1) Construct min heap with e edges.

(2) Take one by one edge and add in spanning tree (cycle should not be created)

Best case (n-1) edges.