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A2

# Prim's Spanning Tree Algorithm

Greedy algorithm

- starts w/ empty spanning tree
- idea is to maintain 2 sets of vertices
  - ▷1st set contains the vertices already included in the MST
  - ▷other set = vertices not included

* disjoint subsets

@ every step it considers all the edges that connect the 2 sets & picks the min. weight edge from these edges. After picking the edge, it moves the other endpoint of the edge to the set containing MST

## CUT IN GRAPH THEORY

- a group of edges that connects 2 sets of vertices in a graph

HOW IT WORKS - a spanning tree = all vertices connected

- so the two* disjoint subsets of vertices must be connected to make a spanning tree. Minimum S.T. = vertices connected w/ min weight edge

## ALGORITHM

```
1) create a set mstSet (keeps track of vertices already in MST)
2) Assign a key value to all vertices in
   input graph. Initialize all key values as
   INFINITE. Assign key value as 0 for the first
   vertex so that it is picked first
3) while mstSet ≠ include all vertices
     a) Pick a vertex u which is not there in mstSet & has minimum key value
     b) Include u to mstSet
     c) Update key value of adjacent vertex v,
        if weight of edge u-v is < the previous key
        value of v, update the key value as weight of u-v
```