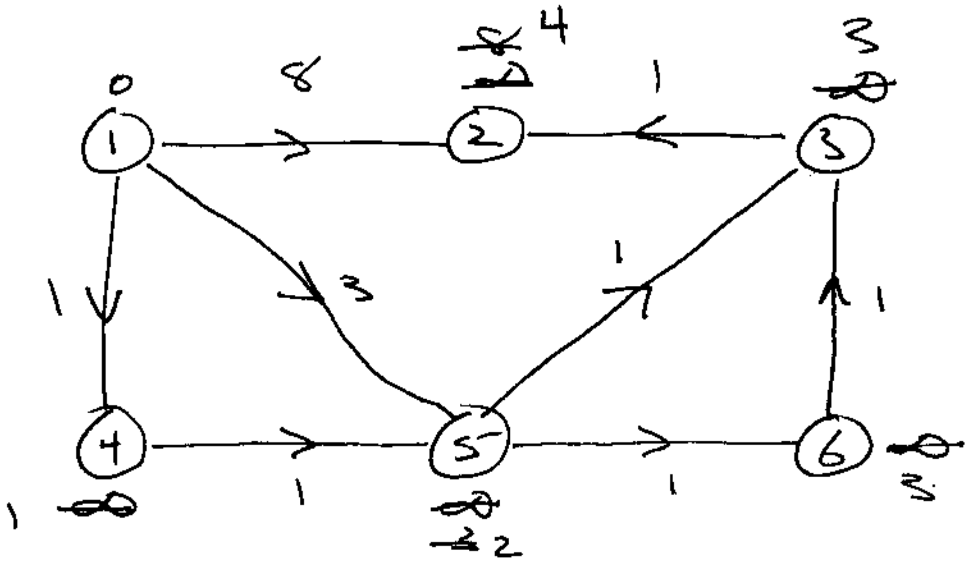
CSE 101 5-26-20

Ex. Dijkstra $\boxed{s=1}$



remove

1
4
5
3
6
2

P.Q.	~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~
d	0	~~8~~ 4	3	1	~~3~~ 2	3
p	n	~~1~~ 3	5	1	~~1~~ 4	5

<u>convention</u>: if multiple minimum keys, remove smaller vertex label first.

Dual Kruskal:

- note Kruskal was 'bottom-up', i.e. start with $\phi \subseteq E(G)$, then add edges until have a MWST
- Dual Kruskal is 'top-down', i.e. start with $E(G)$, then remove edges until have M.W.S.T.

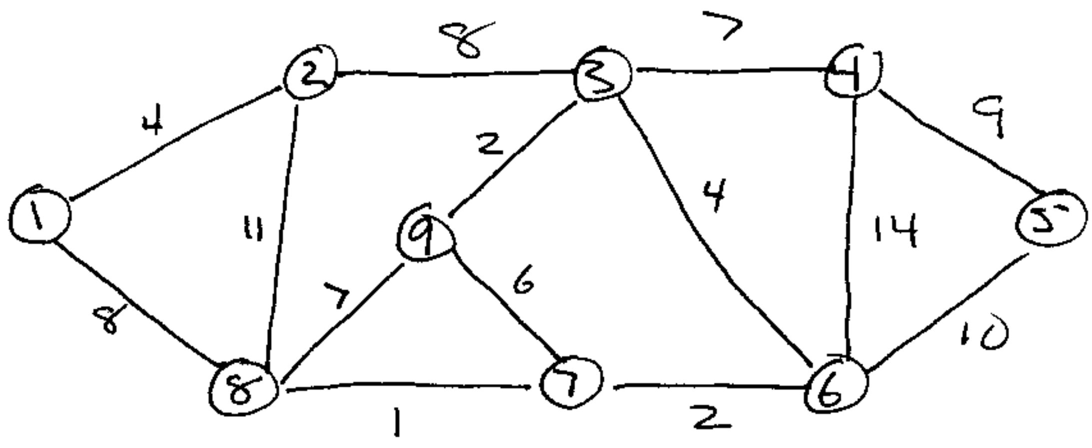
Summary

- start with $F = E(G)$
- amongst all edges in F whose removal would not disconnect (V, F), pick one of maximum weight and remove it.

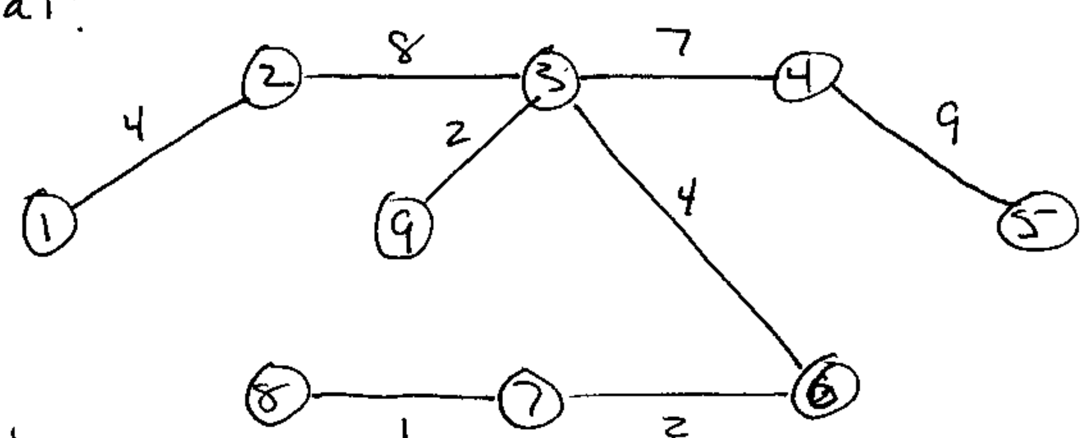
Theorem

- when Kruskal is complete, the subgraph (V, F) is a M.W.S.T.
- same stmt. for DualKruskal.

Ex. (P.632, CLRS)

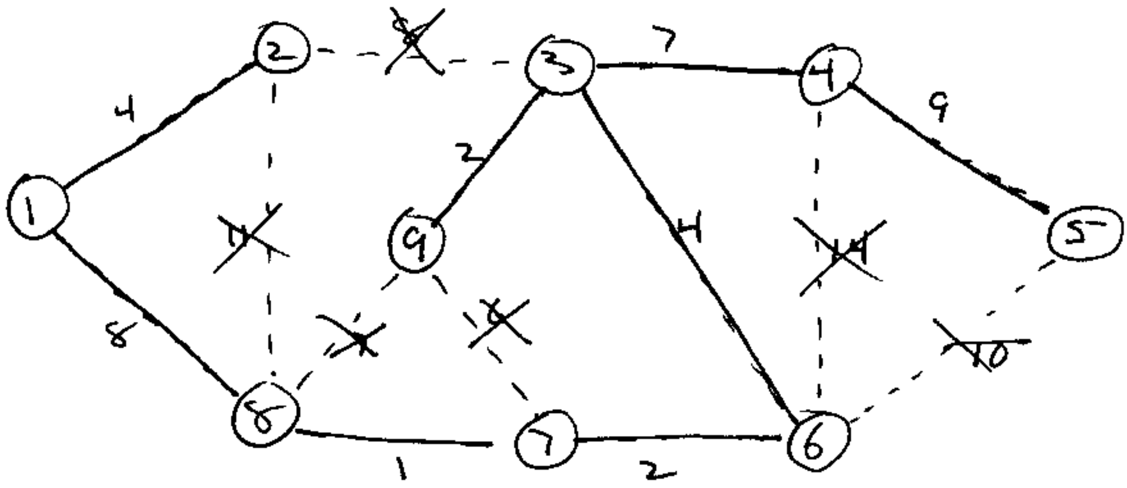


Kruskal:



weight == 37

Dual Kruskal



weight = 37

Prim's Algorithm

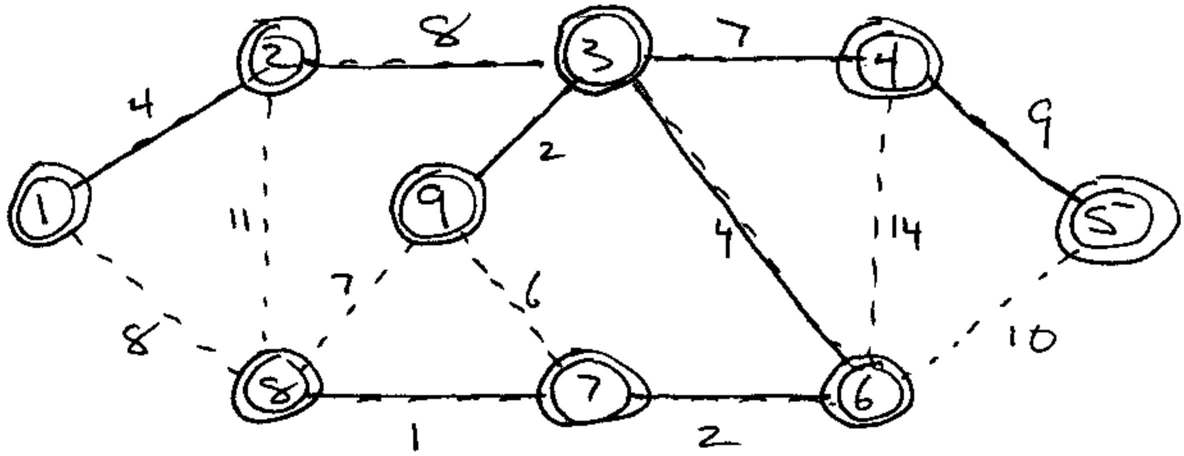
another bottom up approach

- start with $F = \emptyset$
  pick any $r \in V$, let $W = \{r\}$
- amongst all edges in $E - F$ with one end in W and one end in $V - W$, let e be one of minimum weight. let $F = F \cup \{e\}$ and $W = W \cup \{\text{other end of } e\}$

Note: at each stage of execution (W, F) is tree in $G = (V, E)$.

See pseudo-code in /Examples.

Ex.



r
$\shortparallel$

$$W = \{9, 3, 6, 7, 8, 2, 1, 4, 5\}$$
$$F = \{(3,9), (3,6), (6,7), (7,8), (2,3), (1,2), (4,3), (4,5)\}$$

Thm. after Prim is complete, (W, F) is a MWST in G.

Pa7

empty list : ($\overset{0}{|}$)