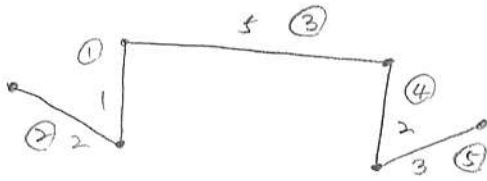


Kruskal

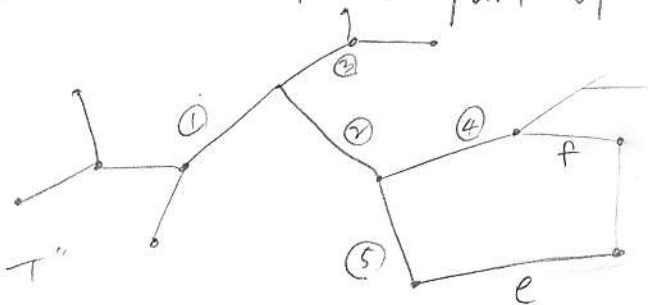


Prim



Proof that Prim's algorithm works

Let  $e$  be the first edge added to  $T$  in prim's algorithm s.t. if  $T'$  is the part of  $T$  up to and including  $e$  then  $T'$  is not a part of any min. spanning tree.



Let  $T''$  be some min spanning tree containing  $T \setminus \{e\}$ .  $T''$  contains both ends of  $e$ .

So there is a path in  $T''$  between those ends.

This path is not contained in  $T'$  or else along with  $e$ ,  $T'$  would have a cycle.

Let  $f$  be the first edge on that path going from the side of  $e$  in  $T' \setminus \{e\}$  to the "new" side.

By the specification of prim's algorithm,

$$w(f) \geq w(e)$$

$(T'' \setminus \{f\}) \cup \{e\}$  improves on  $T''$  ( $\Rightarrow \Leftarrow$ )