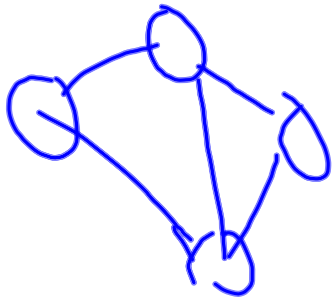
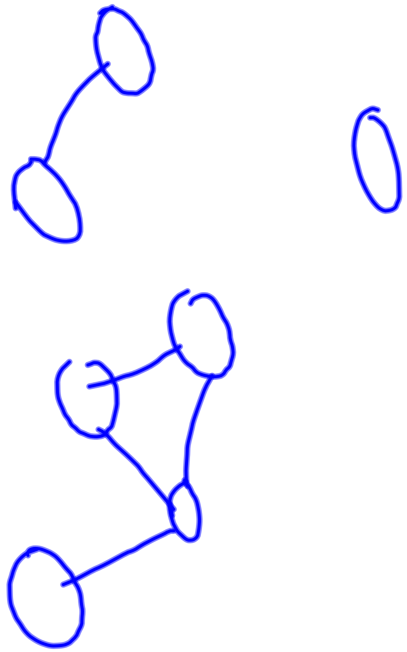
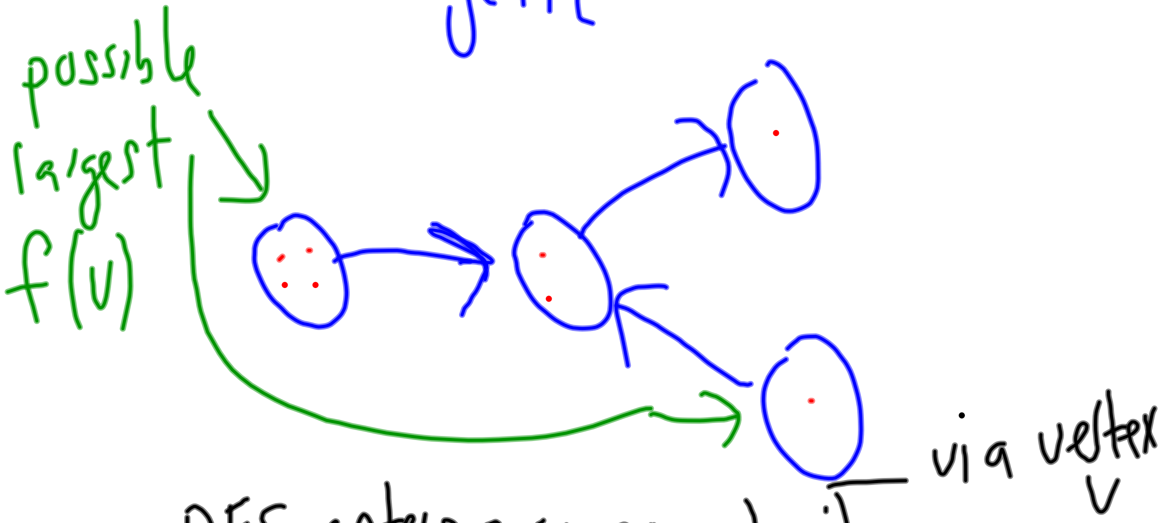




Connected components

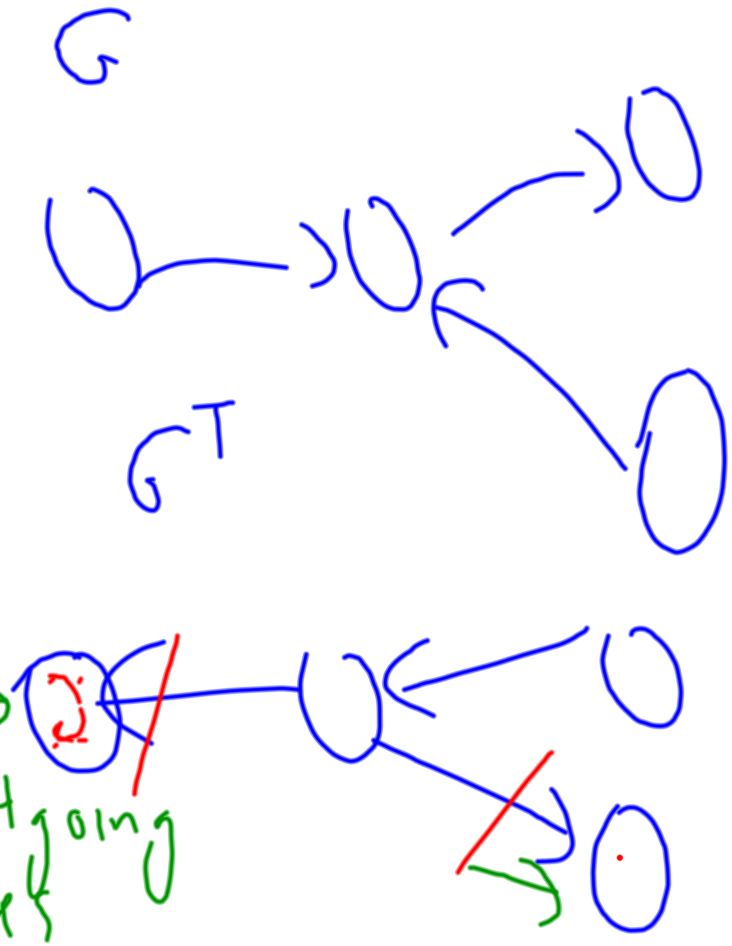
linear $O(V+E)$

component graph is acyclic



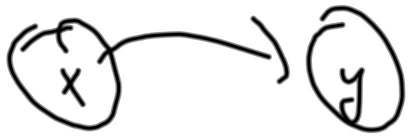
once DFS enters a component, it discovers all vertices in that component before finishing with v.

largest finishing time is in a <u>source</u> in the component graph



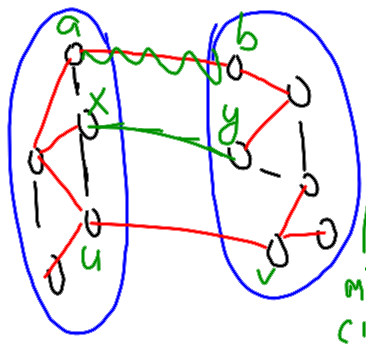
no outgoing edges (sinks)

DFS in a sink, never leaves that component edge in component graph



$f(x) > f(y)$

<u>Proof</u> Assume not. There is some cut for which the min. wt. edge is not in the MST. (call the current alleged MST T)



(u,v) is the min. wt edge in T crossing the cut

(x,y) is the min wt edge crossing cut

$w(x,y) < w(u,v)$. Adding (x,y) to T creates a cycle which crosses the cut at least twice. Let (a,b) be an edge besides (x,y) that crosses the cut. My tree is $T' = T \cup \{(x,y)\} - (a,b)$

$$w(T') = w(T) + w(x,y) - w(a,b)$$

but $w(x,y) < w(a,b)$

$\therefore w(T') < w(T)$ contradicts T being an MST.