Proof

Think about Kruskal's alg.

G	e_1	e_2	e_3	e_4	e_5	e_6	e_7	....	.	e_m
	H	X	X	H	H	X	X	H	H	
	in F			in F	not in F			in F	not in F	
	F-l	F-l	F-l	F-l	F-h	F-h	F-h	F-l	F-h	·F-l···

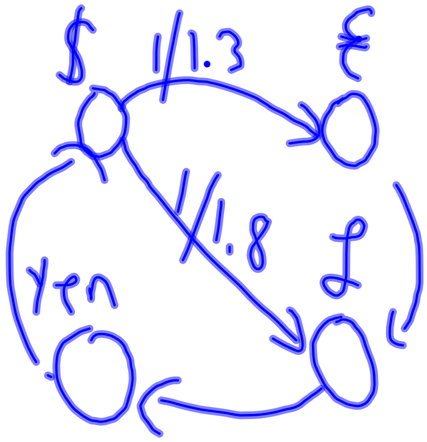
An edge is F-heavy ind. of random choice

edges not in H, but F-light

spanning tree F is formed by, for each F-light edge, flip a coin, if heads, add to tree else don't

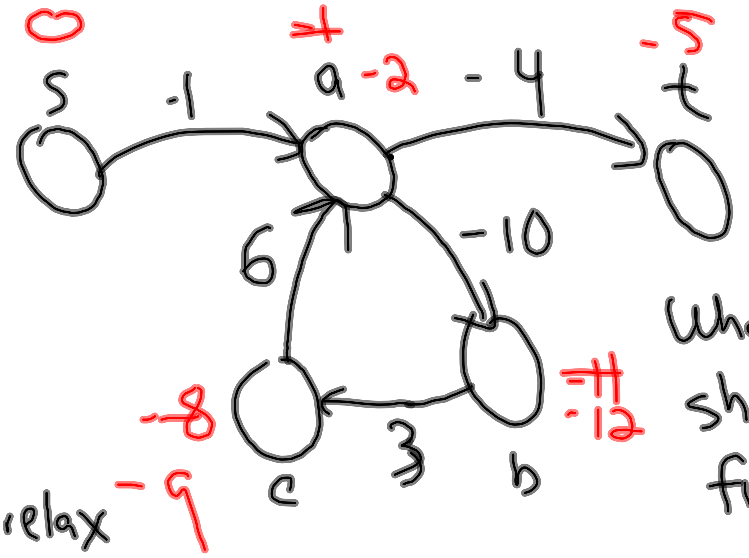
continue until we've added n-1 edges to F.

$\Rightarrow$ we only process $2(n-1)$ F-light edges (in exp.)



$$-\log(r_1 r_2 r_3) > -\log(1)$$

$$-\log r_1 + -\log r_2 + -\log r_3 < 0$$



What is the shortest path from s to t?

Sabcabcabcabcabcabc..

NOT WELL DEFINED

x y

z ← y

neg. cycle & nothing to relax

$$d(y) \le d(x) + w(x,y)$$
$$d(z) \le d(y) + w(y,z)$$
$$d(x) \le d(z) + w(z,x)$$

$(=)$

$$\cancel{d(y)} - \cancel{d(x)} \le w(x,y)$$
$$\cancel{d(z)} - \cancel{d(y)} \le w(y,z)$$
$$\cancel{d(x)} - \cancel{d(z)} \le w(z,x)$$

$$0 \le w(x,y) + w(y,z) + w(z,x)$$

cycle is not negative. contr.

Subpaths of shortest paths are shortest paths

Proof Suppose not, suppose for example, that $b-c-d$ is not the shortest path from b to d.

& p' is shorter.

Then $s-a-b \overset{p'}{\rightsquigarrow} d-t$ is shorter than $s\text{-}abcdt$, a contradiction.

Jan 29-5:16 PM