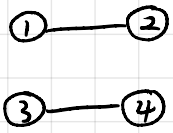
1 (a)

$|M|$

matching : 

(set of edges with node)

Assume $|M| = 1, |V| = 2$

$|M| = 2, |V| = 4$

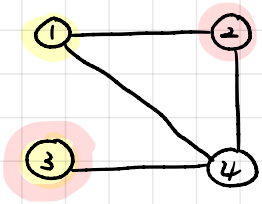
∴ the maximum of number of edges in M equals $\frac{1}{2}|V|$

then, $|M| + |I| \leq |V|$ #

$|I|$

independent set :

(set of nodes without edge)



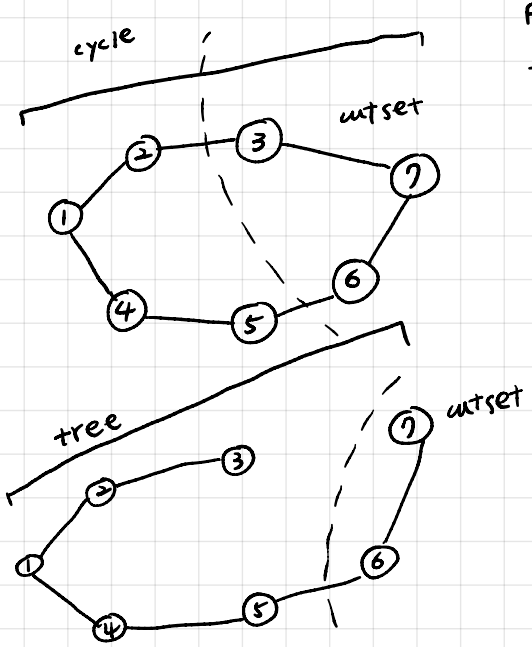
independent set : {1, 3}

{2, 3}

the maximum of number of independent set is equal to $\frac{1}{2}|V|$

$|I| \leq \frac{1}{2}|V|$

(b) True

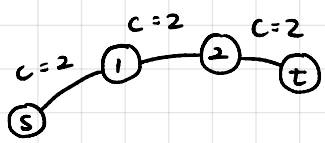


For every edge in the intersection entering the cut, there will be a corresponding edge leaving the cut.

(c)

No, every network doesn't have an upward critical edge.

ex.



(d)

Yes, but every edge in a minimal - cut have downward critical edges.