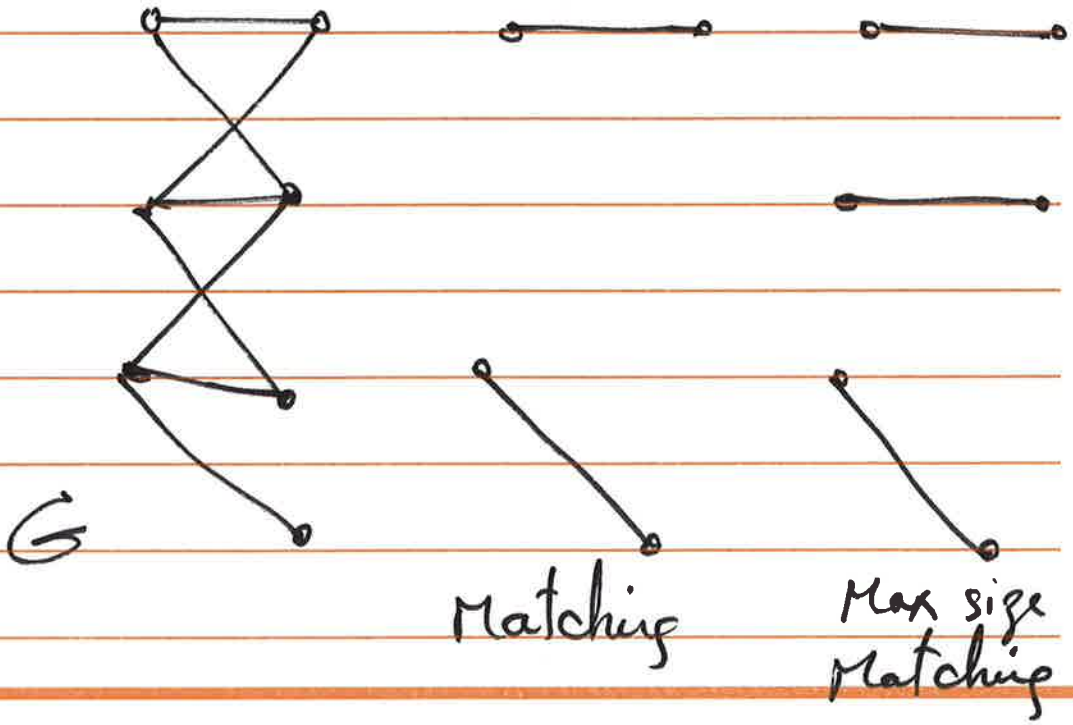
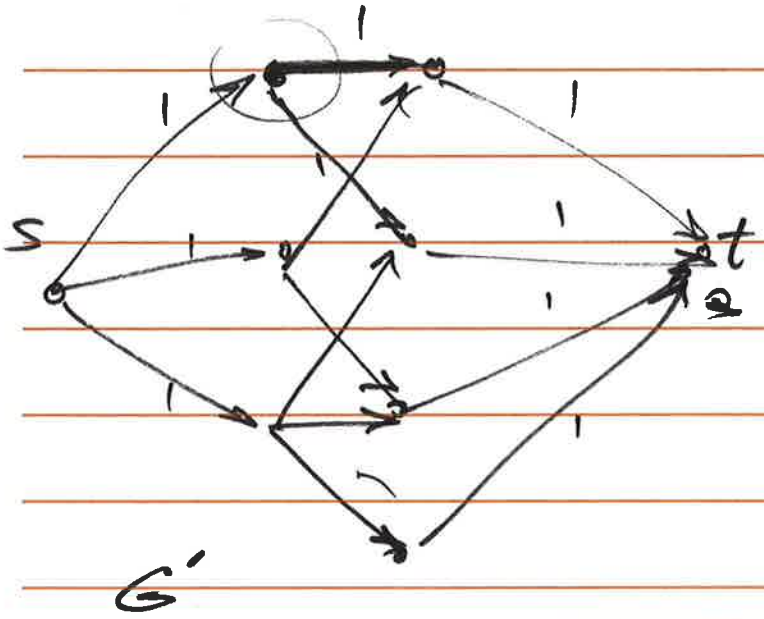
Bipartite Matching Problem

Def. A bipartite graph $G = (V, E)$ is an undirected graph whose node set can be partitioned as $V = X \cup Y$ with property that every edge $e \in E$ has one end in X and the other in Y.

Def. A matching M in G is a subset of the edges $M \subseteq E$ such that each node appears in at most one edge in M

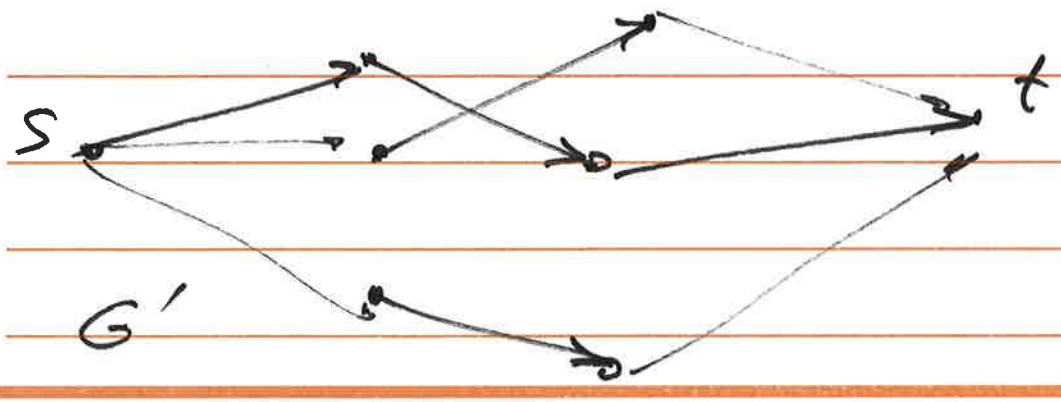


Prob. Statement: Find a matching M of largest possible size.

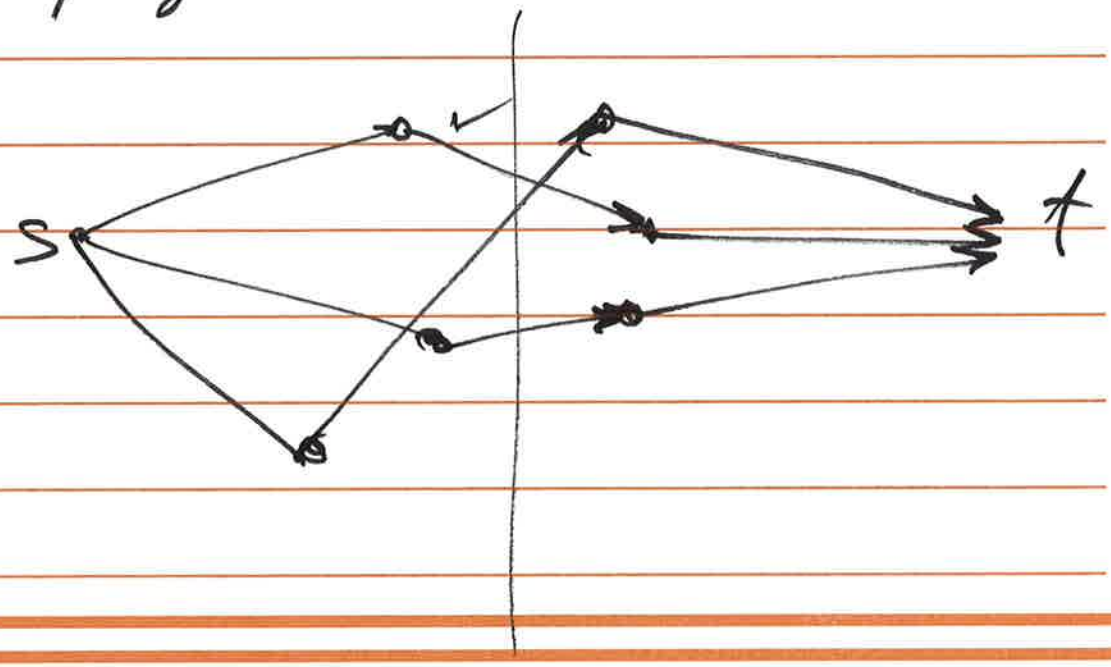


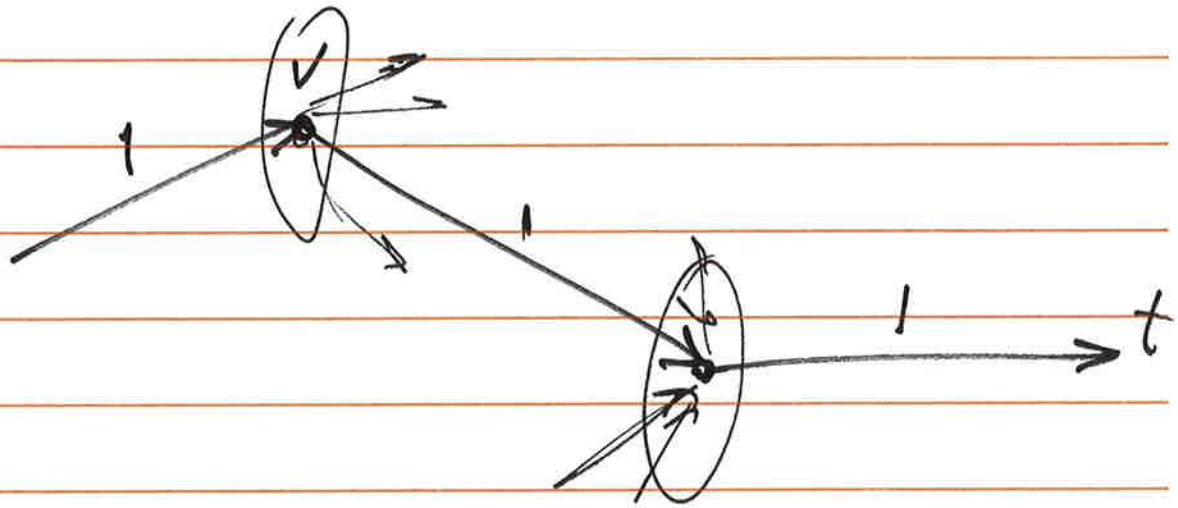
Proof of correctness:

If we have a matching of size k in G, then we can find an s–t flow of value k in G'



If we have an s-t flow f' in G' of value k, I can find a matching of size k in G.





Complexity of the sol. in $O(Cm)$

$C \leq n-1$

$\downarrow$

$O(mn)$