

Bipartite matching problem

N students apply for N jobs.



Each gets several offers.



Is there a way to match all students to jobs?



bipartite matching problem

1	Alice	6	Adobe
	Adobe		Alice
	Amazon		Bob
	Google		Carol
2	Bob	7	Amazon
	Adobe		Alice
	Amazon		Bob
3	Carol		Dave
	Adobe		Eliza
	Facebook	8	Facebook
	Google		Carol
4	Dave	9	Google
	Amazon		Alice
	Yahoo		Carol
5	Eliza	10	Yahoo
	Amazon		Dave
	Yahoo		Eliza

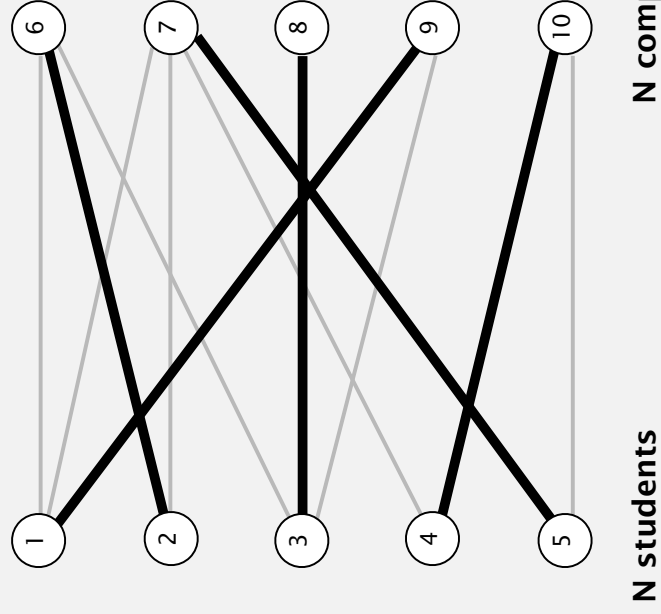
Bipartite matching problem

Given a bipartite graph, find a perfect matching.

perfect matching (solution)

Alice — Google
Bob — Adobe
Carol — Facebook
Dave — Yahoo
Eliza — Amazon

bipartite graph

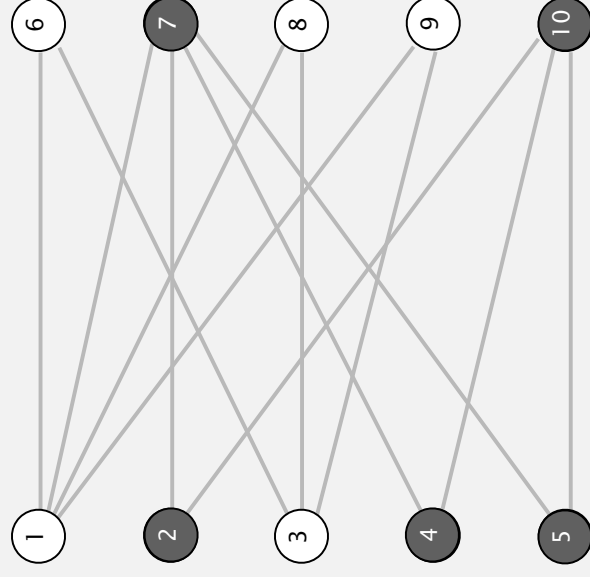


bipartite matching problem

1 Alice Adobe Alice
Adobe Amazon Bob
Google Carol
2 Bob Adobe Amazon
3 Carol Adobe Facebook Eliza
Facebook Google Carol
4 Dave Amazon Google
Amazon Yahoo Alice
5 Eliza Amazon Yahoo Carol
Yahoo Dave
Eliza

~~What the mincut tells us~~

Goal. When no perfect matching, explain why.



no perfect matching exists

$$S = \{ 2, 4, 5 \}$$

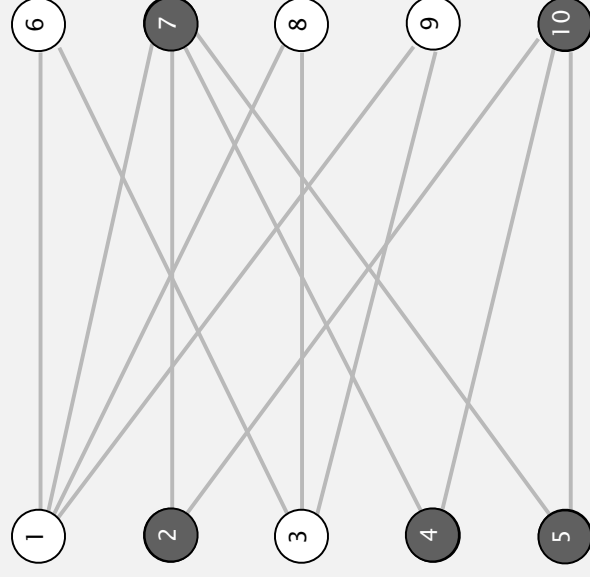
$$T = \{ 7, 10 \}$$

student in S
can be matched
only to
companies in T

$$|S| > |T|$$

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$T = \{ 7, 10 \}$

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