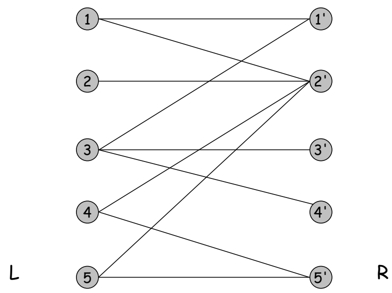
Bipartite Matching

- Given: bipartite graph G = (L ∪ R, E)
- M ⊆ E is a matching if each vertex appears in at most one edge in M.
- Goal: Find a matching of maximum cardinality.



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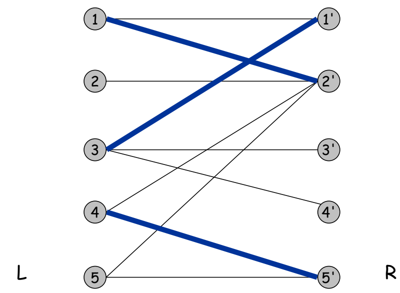

<u>matching</u>
1-2', 3-1', 4-5'

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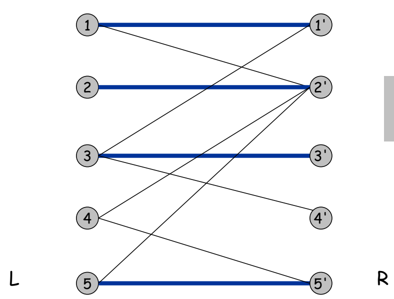

<u>max matching</u>
1-1', 2-2', 3-3' 4-4'

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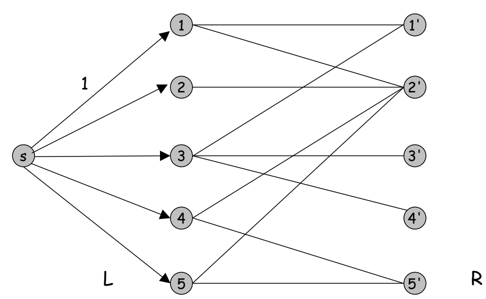

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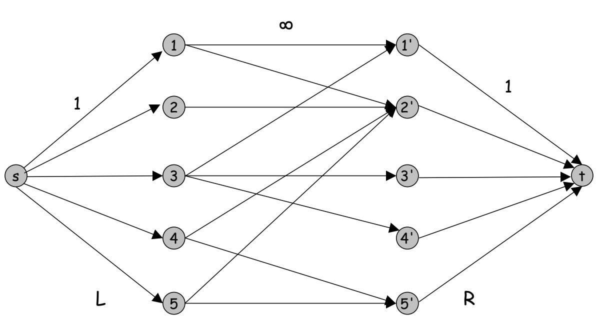
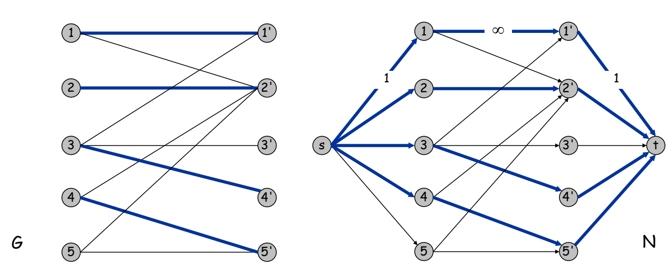


Bipartite Matching: Proof of Correctness

From matching to (integral) flow

- Given matching M of cardinality k.
- Consider flow f that sends 1 unit along each of k paths.
- f is a valid integral flow of value k.



Bipartite Matching: Proof of Correctness

From integral flow to matching

- Let f be an integral flow in N of value k.
- Consider M = set of edges from L to R with f(e) > 0.
- M is valid matching of size k.