Maximum weight matching

- Bipartite graphs are tremendously useful for modeling:
  - Jobs and machines
  - Employers, employers
  - Ads with ad slots
  - Men with women

Matching

- Set of edges with no common endpoints.

- Maximum weight matching: maximum sum of weights on edges.

Max weighted matching problem

- Given a weighted bipartite graph, how can we find a maximum weight matching efficiently?

Ascending auction algorithm for integer weights (n by m)

Fix bid increment
prices on items:
Initiallly prices 0, and matching empty
As long as matching not maximum,
Pick unmatched bidder i, have him bid on item j in
If j unmatched, then M(j) := j,
else, say M(k)=j,

Remove (k,j) from matching and add (i,j), i.e. M(j) := j
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\[ D(p) = \{ j | v_{ij}p_j \geq v_{ik}p_k, \text{and } 0 \} \]