Algorithms – handout 7

Matchings

December 23, 1999

As we have seen, bipartite matchings are intersections of two matroids, but are not matroids themselves. We shall show how to find maximum cardinality matchings in bipartite graphs, and more generally, in arbitrary graphs (Edmonds' algorithm). The algorithm uses the notion of alternating paths. Similar to greedy algorithms, it constructs a sequence of partial solutions, each larger than the previous one. However, unlike greey algorithms, when extending from one solution to another, it retracts some of the decisions of the former solution.

Remarks:

- There will be no lecture notes associated with today's lecture.
- The final exam for this course is planned to take place on Thursday, February 10.

Homework:

1. Show that a bipartite graph $G(V, E)$ has a perfect matching iff for every set H of vertices, $|N(H)| \geq |H|$, where $N(H)$ is the set of neighbors of H. (H and $N(H)$ need not be disjoint.)
2. Show that every bipartite d-regular graph is the disjoint union of d perfect matchings.