Last name _____

First name _____

LARSON—MATH 656—CLASSROOM WORKSHEET 13
Stable Matchings.

Organizational Notes

1. Don't forget to send your Notes / Classroom worksheet after each class (make the email subject useful: like "Math 656 c13 notes").
2. The VCU Discrete Math Seminar is every Wednesday.
3. Homework #3 (h03) is due today.
4. Homework #4 (h04) is due next Monday.
5. Homework #5 (h05) is the Test Review.
6. Test 1 is Monday, Mar. 22.
7. Read ahead! Next up we'll talk about stable and general matching algorithms (Sec. 3.2, Sec. 3.3), Tutte's Theorem and the Gallai-Edmonds Mathcing Decomposition (as described in the West paper).

Concepts & Notation

- Sec. 3.2: maximum bipartite matching algorithm, maximum weighted bipartite matching algorithm, transversal, Assignment Problem, stable matching.
- Sec. 3.3: general (cardinality) matching, Tutte's Theorem, Edmonds-Gallai Decomposition.

Review

1. Given a weighted $X-Y$-bigraph (which we can assume to be $K_{n,n}$) with non-negative weights $\{w_{i,j}\}$ and (not necessarily optimal) cover (u, v), what is the *excess* of an edge $x_i y_j$?

2. What is the Hungarian Method?

3. Why is the Hungarian method guaranteed to terminate?

4. Why is the Hungarian method guaranteed to produce a maximum weighted matching?

Notes

1. Given n "men", n "women" and linearly ordered preferences for each, what is an *unstable pair*?

2. Given n "men", n "women" and linearly ordered preferences for each, what is an *stable matching*?

3. Given n "men", n "women" and linearly ordered preferences for each, what is an algorithm for producing a stable matching?

4. Is this algorithm *biased* (does it produce similar outputs regardless of whether men's or women's preferences are favored)?

5. Why is this algorithm guaranteed to terminate?

6. Why is this algorithm guaranteed to produce a stable matching?

7. What is the problem with applying the idea of Berge's Theorem to finding a maximum matching in a general graph (and why did it work in bipartite graphs)?

8. What is a Hungarian Tree/Forest with respect to a matching M in a general graph?