

Last name \_\_\_\_\_

First name \_\_\_\_\_

**LARSON—MATH 656—CLASSROOM WORKSHEET 01**  
**Matching Theory.**

**Concepts & Notation**

- Sec. 3.1: matching, saturate, maximum vs. maximal matching, M-alternating path, M-augmenting path, Berge's Theorem, Symmetric Difference Lemma, Hall's Condition, Hall's Theorem.

**Daily Notes**

- Syllabus
- Book
- Daily Plan
- CoCalc
- Daily Worksheet

**Background**

1. What are graphs, and what can they be used for?

2. What is the history of graph theory, what are its origins?

### Notes

3. What is a *matching*?

4. What does it mean for a matching to *saturate* a vertex?

5. What is the difference between a *maximal* and *maximum* matching?

6. If  $M$  is a matching, what is an  $M$ -alternating path?

7. If  $M$  is a matching, what is an  $M$ -augmenting path?

8. What is *Berge's Theorem*?

9. Prove it!

10. What is the *Symmetric Difference Lemma*

11. Prove it!

12. What is *Hall's Condition*?

13. Prove it!

14. What is *Hall's Theorem*?

15. Prove it!