University of Minnesota
Department of Applied Economics
Math Review

Summer 2019

Instructor:	Natalia Ordaz Reynoso	Meeting times:	M-F 9:00 – 12:00
Email:	ordaz008@umn.edu	Room:	Ruttan Hall 119
Office Hours:	M-F 12:00- 13:00		

Course Description

This is a non-credit course for incoming Ph.D. students in Applied Economics and related fields. Current MS students may also participate if interested. In the next three weeks, the goal is to review the fundamental concepts that will be useful in the Microeconomic Theory sequence (APEC 8001– 8004).

Books:

- The following list includes books that I have used for class slides, and books that I believe will be useful to you for future reference, or if you want to further review a topic. Having or using these books is not required for this course, but some of them will my be helpful to you for your first year.

  1. [MWG] Andreu Mas-Colell, Whinston, M., Green, J. R. (1995)
  2. [B&S] Bartle, R. G., Sherbert, D. R. (2010). Introduction to Real Analysis. (3rd Edition)
  3. [Hammack] Hammack, R. (2013). Book of Proof. (Edition 2.1)
  4. [Sundaram] Sundaram, R. K. (1996). A First Course in Optimization Theory.

- I have also taken input from the work done by previous math review instructors, in particular Vanee Dusorouth and Yu Wang.

Exercises:

- I will assign problem sets for each topic we cover. There is no grade attached to this course, so these problem sets are just for you to practice. I will provide you with the answers to the problem sets and discuss some in class. You are welcome to discuss them further with me during office hours.

- You can find class Slides and problem sets on my website

Below you can find a list of topics and the books that we will use for reference for each one:

1.   Preliminaries

- B&S Appendix A
- B&S Chapter 1
- Hammack Chapters 1 and 2

2.   Mathematical Proofs

- B&S Appendix A
- Hammack Chapters 4 to 10

3.   Real Numbers

- B&S Chapter 2

4.   Introduction to R^n and Topology

- B&S Chapter 11

4.1.   Convex sets and Separating Hyperplanes

- MWG Mathematical Appendix M.G.

5.   Important Properties of Functions

- Hammack Chapter 12

5.1.   Homogeneity

- MWG Mathematical Appendix M.B

5.2.   Concavity and Quasiconcavity

- Sundaram Chapters 7 and 8
- MWG Mathematical Appendix M.C

5.3.   Continuity

- B&S Chapter 5
- MWG Mathematical Appendix M.F

5.4.   Fixed Point Theorems

- MWG Mathematical Appendix M.I

5.5. Limits

- B&S Chapters 3 and 4

6. Calculus

- B&S Chapter 6
- Sundaram Chapter 2
- MWG Mathematical Appendix M.A

7. Optimization

- MWG Mathematical Appendix M.J
- MWG Mathematical Appendix M.K
- Sundaram Chapters 2 and 4

7.1. Theorem of Lagrange

- Sundaram Chapter 5

7.2. Theorem of Khun Tucker

- Sundaram Chapter 6

Aside: The Envelope Theorem

- MWG Mathematical Appendix M.L

8. Matrix Algebra

- Sundaram Part 1.3

8.1. Positive and negative semidefinite matrices

- MWG Mathematical Appendix M.D

Linear Programming

- MWG Mathematical Appendix M.M

9. Dynamic Programming

- MWG Mathematical Appendix M.N
- Sundaram Chapters 11 and 12