MATHEMATICAL METHODS FOR OPTIMIZATION
MATHEMATICS 170

UC Berkeley, Fall, 2020

Instructor: Professor Lawrence C. Evans

evans@math.berkeley.edu

GSI: Haotian Gu

haotian_gu@berkeley.edu

Classes:

Online lectures (live on Zoom)–MWF 9:10-10:00 am

I intend to post on bCourses recordings of each lecture and also the computations I write out. The first class will be Wednesday, August 26.

Office hours:

Online office hours (LCE)–MWF 10:00–11:00 am

Online office hours (HG)– M 4:00–6:00 pm & Th 2:00–3:00 pm.

Prerequisites: Mathematics 53, 54

Notes for course: I will post on bCourses extensive online lecture notes for Math 170. (The book *Methods of Mathematical Economics* by Franklin is optional additional reading. It is available free online for UC Berkeley students, through www.lib.berkeley.edu)

Grading, homework: 25% homework; 25% midterm; 50% final exam. I will post the tests online, and students will then have 24 hours to work them.

Homework will be due on the days of most class meetings; please upload your solutions to the bCourse page.

Midterm: The midterm will be on WEDNESDAY, OCTOBER 21. I will release the midterm questions online at 10 am on that date and students will have 24 hours to complete the test.

TOPICS

• **Calculus methods**: Unconstrained minimizers, constraints and Lagrange multipliers, applications

• **Linear programming**: Theory, duality theory, simplex algorithm, applications

• **Convexity**: Convex geometry, separating hyperplanes, convex functions, subdifferentials, dual convex functions

• **Nonlinear optimization**: Inequality and equality constraints, constraint qualification, Karush-Kuhn-Tucker conditions

• **Convex optimization**: Variational inequalities, convexity and Lagrange multipliers, Slater's condition, duality and minimax

(I will teach a second course Math 195 during Spring, 2021 on the calculus of variations and optimal control theory.)