# Mathematics 116
## Convexity and Optimization with Applications

Assignment VII — Due in class on November 24.

Announcements — In addition to office hours and sections, help is also available on Sundays at 8pm at the Math Question Center in Loker Commons. Sections are Thursday at 5:00 in SC116 and Friday at 2:00 in SC216. Please be thinking about and discussing potential project topics. Note: The midterm will be in class on Wednesday, December 3.

Reading — Chapter 5, glance at 6, paying special attention to §6.5 and §6.6.

Exercises — Do four of these from Luenberger §5.14: #6, 10, 15, 16, 23.
Do one of these from Luenberger §6.12: #12, 14, 15.

Writing — Include your answer with your problem set (counts as an exercise).

Let $w_t(a) = 0$ and, for $t$ in $[a,b]$, suppose $w_t(s)$ is zero for $s < t$ and equals 1 for $s > t$. Considered as an element of NBV[a,b], describe how $w_t$ determines an element of the dual space of C$[a, b]$ by showing what it does to a typical continuous function x on $[a,b]$. What is the norm of $w_t$ ? Now suppose that $t_n$ is a sequence in $[a, b]$ converging to $t_0$. What can you say about the sequence $w_{t_n}$ ? Does it converge strongly? Is it weak-* convergent? How does your answer relate to Alaoglu's Theorem? Do you think linear combinations of functions of the form $w_t$ are dense in NBV$[a,b]$? Weak-* dense? Discuss and illustrate your guesses, but you need not provide proofs.

Discussion — For section. You are also encouraged to post what you find to the discussion section of our website, along with any questions or observations you might also have.

1. Study and talk over the applications presented in §5.9.

2. What does the proof of Alaoglu's Theorem in §5.10 remind you of? Discuss the proof of Theorem 2 in that section, and why it is equivalent to Corollary 2 of the Hahn-Banach Theorem in §5.4.