Mathematics 116
Convexity and Optimization with Applications

Assignment I	Due in class on Tuesday, February 15.
Announcements	Sections begin next Monday. Details will be announced in class and on the web.
Reading	Study chapters 2 and 3 of Sundaram's FCOT. For background material, see also §1.2 and the Appendices. Read chapter 1 and glance through chapter 2 of Luenberger's OVSM. For those interested in finding out more about making rigorous arguments, the book *How to Read and Do Proofs* by Daniel Solow is a classic.
Exercises	From FCOT§1.7: #2, #16, #17, #26, #27, #32; §2.6: #3, #4; and §3.4: #5, #8.
Writing	In addition to handing these few paragraphs in with the other problems, you may also post your answers to the discussion section of the website (www.courses.fas.harvard.edu/~math116). 1. Find or think up another theoretical or applied problem related to convexity and optimization of interest to you and write up a brief description of it in the style of §1.2 of Luenberger or §2.3 of Sundaram. 2. Find and describe another theoretical or applied situation where a vector space other than Euclidean *n*-space is important. Explain why it is important and give references. How do you know the space you found is actually different from $\mathbf{R}^n$?
Discussion	Please come to sections prepared to discuss the following questions. If you want to post your answers on the web site, please do so by Sunday. 1. What have you discovered so far about the Steiner Problem? Conditions for a solution in various cases? Interesting generalizations? What does the "dual" problem have to do with it? 2. Why should you believe the Principle of Nested Closed Intervals? Is there such a principle for open intervals? How does PNCI generalize?
Words	Vocabulary to know includes: sup, inf, limit, continuous function, compact set, closed set, bounded set, sequence, subsequence, Weierstrass Theorem, Principle of Nested Closed Intervals.