

Mathematics 116

Convexity and Optimization with Applications

- Assignment I Due in class on Monday, September 29.
- Announcements Sections begin this week on Friday at 2 and Thursday evening. Details will be announced in class and on the web. We are fortunate to have as course assistants for Math 116 both Keziah Ruth Cook (kcook@fas) and Michael McElroy (mbmcelr@fas).
- Reading Study chapters 1 and 2 of Luenberger. Many many other books begin by covering the same or similar material—almost anything with the words “Functional Analysis” in the title, for example. It may be instructive to compare and contrast different treatments. 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 Luenberger §2.16: #3, #4, #5, #7, #8, #9
- 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.
 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 before Thursday afternoon.
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. Prove the Lemmas mentioned in class about vector spaces, such as the uniqueness of the identity and of inverses, the fact that $0x = \mathbf{0}$, and $(-x) = -(x)$, etc.