Mathematics 116
Convexity and Optimization with Applications

Assignment II — Due in class on Monday, October 13 (you have two weeks).

Announcements — The Friday section will meet again on Monday, October 6 in SC 216.
Lectures that week will be on Wednesday the 8th and Friday the 10th.
Thursday sections will meet as usual at 8:00 pm in SC 111.
You are always welcome to attend either section or both.
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 2 and 3 of Luenberger and compare with other texts. For those interested in more about making rigorous arguments, the book *How to Read and Do Proofs* by Daniel Solow is a classic.

Exercises — From Luenberger §2.16: #12, #13, #14, #15, #17, #19. You may confer with friends, especially about #15, but please write up your own answers and, as always, cite all your sources (people, paper, web, etc.)

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. Write a paragraph or so explaining completeness in your own words. Include examples and say why you think this idea is significant when considering optimization problems.

2. Write a paragraph or so explaining compactness in your own words. Include examples and say why you think this idea is significant when considering optimization problems.

Discussion — Please come to sections prepared to discuss the following questions. You are also encouraged to post thoughts about these or other issues beforehand.

1. Is the completion you found (at length) in problem #15 unique? What could or should this mean?

2. How do you think the real numbers should be defined and why? Couldn't we just say they are the closure of the rationals?

3. How are L^p spaces are defined in some other book on analysis or on applications? Compare and contrast with our approach.

4. Does $g(x) = (|\square_1| + |\square_2|)^2$ define a norm on $\mathbf{R}^2$? Other examples?