

Math 354, Section 04
Linear Optimization
Quiz

Instructions: You have 40 minutes to complete the quiz. There are six questions, worth a total of eighteen points. Partial credit will be given for progress toward correct solutions where relevant. You may not use any books, notes, calculators, or other electronic devices.

Name: _____

RUID: _____

Question	Points	Score
1	3	
2	3	
3	3	
4	3	
5	3	
6	3	
Total:	18	

Consider the following linear programming problem.

A doctor treats a common disease with the commercially available pills A and B. Pill A costs 40 cents per pill and Pill B costs 10 cents per pill. They each contain a mixture of compound C, the actual medication needed, and an activator, compound D. Pill A contains 4 mg of Compound C and Pill B contains 2 mg of Compound C; they each contain .5 mg of the activator Compound D. The usual dosage needed is 10 mg of Compound C per day; furthermore, the activator can be harmful in large doses, and the doctor therefore limits the amount of Compound D consumed to no more than 2 mg per day. Dosages may if necessary be in half-pill units using a pill-cutter. What is the cheapest prescription the doctor can write that contains enough Compound C and a safe amount of Compound D?

1. [3pts.] Write down this problem as a system of equations in standard form, including both the objective functions and the constraints.
2. [3pts.] Graph the set of feasible solutions to the problem.

3. [3pts.] Find the optimal prescription. Justify your answer.
4. [3pts.] Transform your set of equations from question (2) into canonical form. Write this down both as a system of equations and in matrix notation.

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5. [3pts.] What are the values of the slack variables from question (4) at the optimal solution you found in question (3)? What does that represent physically?
6. [3pts.] Suppose the price of Pill B rises to 25 cents per pill. Does that change what the cheapest prescription is?