

Math 164, Lecture 2, Vese
Homework #6, due on Wednesday, November 9, 2005

Important remarks:

- Reminder: midterm exam on Wednesday, November 9, 1-2pm (MS 6229). This will be a closed note and closed book written examination.
- Sections covered for the midterm: 1.2-1.5, 2.2-2.3, 3.1, 4.1-4.4, 5.2, and 6.1.
- Additional office hours with the instructor before the midterm:
 - Friday Nov. 4 (time 2-3pm and 5pm-6pm),
 - Monday Nov. 7 (time 2-3.45pm), in MS 7620-D.
 - Please note: there are no office hours with the instructor Vese on Tuesday Nov. 8 or on Wednesday Nov. 9.
 - Tuesday Nov. 8, the office hours will be only with the T.A. Tristan Roy.
- Sample midterm questions are posted on the class webpage
- Handout on the simplex method is posted on the class webpage.

Problems:

- [1] Consider the linear program of problem [5] from the previous homework, recalled here:

$$\text{minimize } z = -5x_1 - 7x_2, \text{ subject to } \begin{cases} -3x_1 + 2x_2 \leq 30 \\ -2x_1 + x_2 \leq 12 \\ x_1, x_2 \geq 0. \end{cases}$$

Show by any method that this problem has no finite optimal solution.

- [2] Find the dual of

$$\begin{aligned} &\text{minimize } z = 3x_1 - 5x_2 - 7x_3, \\ &\text{subject to} \\ &x_1 + 5x_2 - 8x_3 \geq 5 \\ &4x_1 - 2x_2 + 7x_3 \geq 7 \\ &x_1, x_2, x_3 \geq 0. \end{aligned}$$

- [3] Find the dual of

$$\begin{aligned} &\text{maximize } z = 6x_1 - 3x_2 - 2x_3 + 5x_4, \\ &\text{subject to} \\ &4x_1 + 3x_2 - 8x_3 + 7x_4 = 11 \\ &3x_1 + 2x_2 + 7x_3 + 6x_4 \geq 23 \\ &7x_1 + 4x_2 + 3x_3 + 2x_4 \leq 12 \\ &x_1, x_2 \geq 0, x_3 \leq 0, x_4 \text{ free} \end{aligned}$$

Verify that the dual of the dual is the primal.

- [4] Find the dual to the problem

$$\begin{aligned} &\text{minimize } z = c^T x, \\ &\text{subject to } b_1 \leq Ax \leq b_2, \\ &x \geq 0. \end{aligned}$$