

The first test will be in-class on Friday October 10. You may bring one 8.5x11 sheet of paper with anything written on it; no other notes or books are allowed. You may use a calculator during the test, but only for arithmetic operations on scalars. No linear algebra functions (such as matrix multiplication or inverting a matrix) may be used.

Do 4 of the following 5 problems.

Other interesting problems: 3.18ae, 3.20, 3.21, 3.22, 3.24

1. Exercise 3.17. You may use a calculator or software program such as Maple or Sage to help with matrix calculations (indicate if you do), but you must write down each iteration of the simplex algorithm.
2. Solve the following linear program using the simplex algorithm.

$$\begin{array}{ll} \min & -3x_1 - x_2 \\ \text{subject to} & x_1 - x_2 \leq -1 \\ & 2x_1 - x_2 \leq 2 \\ & x_1, x_2 \geq 0 \end{array}$$

3. Consider the following simplex tableau:

$$\begin{array}{rcccccc} & x_1 & x_2 & x_3 & x_4 & x_5 & x_6 \\ 2 & -2 & -3 & 1 & 12 & 0 & 0 \\ x_5 = & 0 & -2 & -9 & 1 & 9 & 1 & 0 \\ x_6 = & 0 & 1/3 & 1 & -1/3 & -2 & 0 & 1 \end{array}$$

- (a) Apply the simplex method with the following pivot rules:
 - i. The non-basic variable with the most negative cost enters the basis, and
 - ii. In case of ties for the leaving variable, choose the row that is *higher up* in the tableau as the pivot row.

Show that the simplex method cycles with these rules.
- (b) Use the simplex method with either the lexicographic rule or Bland's rule to solve the linear program.

4. Exercise 3.18bcd

5. Exercise 3.19