MS3530: Advanced Operations Research

Practice Assignment 1

Q1   Solve the following problem using the Revised Simplex Method

Min $x_1 + 6x_2 - 7x_3 + x_4 + 5x_5$

ST $x_1 - \frac{3}{4}x_2 + 2x_3 - \frac{1}{4}x_4 \qquad = 5$

$$-\frac{1}{4}x_2 + 3x_3 - \frac{3}{4}x_4 + x_5 \quad = 5$$

$$x_1, \quad x_2, \quad x_3, \quad x_4, \quad x_5 \quad \geq 0$$

Q2   Solve Q1 by product form of the inverse.

Q3   Use the simplex method for bounded variables to solve the following problem:

Max $2x_1 + x_2 + 3x_3$

ST $3x_1 + x_2 + x_3 \leq 12$

$$-x_1 + x_2 + \qquad \leq 5$$

$$x_2 + 2x_3 \leq 8$$

$$0 \leq x_1 \leq 3$$

$$0 \leq x_2 \leq 6$$

$$0 \leq x_3 \leq 4$$

Q4   Use the simplex method for bounded variables to solve the following problem:

Min $6x_1 + 2x_2$

ST $x_1 + x_2 \geq 4$

$$-x_1 - 2x_2 \leq 0$$

$$x_1 \geq 2$$

$$x_2 \geq 1$$