1. Consider the LP

$$\begin{cases} 5x_1 + 4x_2 + 3x_3 + 2x_4 & \to & \max \\ x_1 + 2x_2 + x_4 & \leq & 1 \\ x_1 + x_2 + 2x_3 & \leq & 2 \\ x_1 + 2x_3 + 2x_4 & \leq & 3 \\ x_1, x_2, x_3, x_4 & \geq & 0. \end{cases}$$

(a) Use the Simplex algorithm to solve the LP.

(b) Apply methods as in the lecture (Section 6.2) to derive the optimal tableau.

2. Use the Big M-Method to solve

$$\begin{cases} 5x_1 - 3x_2 + x_3 & \to & \min \\ 2x_1 + x_2 + x_3 & = & 6 \\ x_1 + 2x_2 + x_3 & = & 6 \\ x_1, x_2, x_3 & \geq & 0. \end{cases}$$

3. Solve

$$\begin{cases} 8x_1 + 10x_2 + 18x_3 & \to & \min \\ x_1 + x_2 + x_3 - x_4 & \geq & 2 \\ -x_2 - 3x_3 - x_4 & \leq & 3 \\ x_1, x_2, x_3, x_4 & \geq & 0 \end{cases}$$

by solving the dual LP graphically and using the complementary conditions.