

Math336 HW3 (Spring 2020)

Professor Youngjoon Hong

Due Date: Mar. 12 (3:30 pm)

Problem 1 *Solving the following problem using the algebraic solutions method:
Maximize $10x + 35y$ subject to:*

$$8x + 6y \leq 48, \quad (\text{board fit lumber}),$$

$$4x + y \leq 20, \quad (\text{hr of carpentry}),$$

$$y \geq 5, \quad (\text{demand}),$$

$$x, y \geq 0 \quad (\text{non negativity}).$$

Problem 2 *Solving the following problem using the simplex method:*
Maximize $2x + 3y$ subject to:

$$2x + y \leq 18,$$

$$6x + 5y \leq 60,$$

$$2x + 5y \leq 40,$$

$$x, y \geq 0$$

Problem 3 Consider a company that carves wooden soldiers. The company specializes in two main types: Confederate and Union soldiers. The profit for each is \$28 and \$30, respectively. It requires 2 units of lumber, 4 hr of carpentry, and 2 hr of finishing to complete a Confederate soldier. It requires 3 units of lumber, 3.5 hr of carpentry, and 3 hr of finishing to complete a Union soldier. Each week the company has 100 units of lumber delivered. There are 120 hr of carpenter machine time available and 90 hr of finishing time available. Determine the number of each wooden soldier to produce to maximize weekly profits using the simplex method.

Problem 4 *Perform a complete sensitivity analysis (objective function coefficients and right hand side values) of the wooden toy soldier problem in Problem 3.*