

**MA 162 Recitation Worksheet Thursday 9<sup>th</sup> October 2014**

1. Write the linear programming problem as a standard maximization problem if it is not already in that form and write the initial simplex tableau.

Maximize  $P = x + 3y + 4z$  subject to the constraints

$$\begin{aligned} x + 2y + z &\leq 40 \\ -x - y - z &\geq -30 \\ x \geq 0, y \geq 0, z &\geq 0 \end{aligned}$$

2. Solve each linear programming problem by the simplex method

|  |  |   |
|--|--|---|
| <p>a) Maximize <math>P = 3x + 4y</math><br/>         Subject to <math>x + y \leq 4</math><br/> <math>2x + y \leq 5</math><br/> <math>x \geq 0, y \geq 0</math></p> | <p>b) Maximize <math>P = 4x + 6y</math><br/>         Subject to <math>3x + y \leq 24</math><br/> <math>2x + y \leq 18</math><br/> <math>x + 3y \leq 24</math><br/> <math>x \geq 0, y \geq 0</math></p> | <p>c) Maximize <math>P = 12x + 10y + 5z</math><br/>         Subject to <math>2x + y + z \leq 10</math><br/> <math>3x + 5y + z \leq 45</math><br/> <math>2x + 5y + z \leq 40</math><br/> <math>x \geq 0, y \geq 0, z \geq 0</math></p> |
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3. A division of the Winston Furniture Company manufactures dining tables and chairs. Each table requires 40 board feet of wood and 3 labor-hours. Each chair requires 16 board feet of wood and 4 labor-hours. The profit for each table is \$45, and the profit for each chair is \$20. In a certain week, the company has 3200 board feet of wood available and 520 labor-hours available. How many tables and chairs should Winston manufacture to maximize its profit? What is the maximum profit.
4. A company manufactures Products  $A, B, C$ . Each product is processed in three departments:  $I, II$ , and  $III$ . The total available labor-hours per week for departments  $I, II$ , and  $III$  are 900, 1080, and 840, respectively. The time requirements (in hours per unit) and profit per unit for each product are as follows

|                  | Product A | Product B | Product C |
|------------------|-----------|-----------|-----------|
| <b>Dept. I</b>   | 2         | 1         | 2         |
| <b>Dept. II</b>  | 3         | 1         | 2         |
| <b>Dept. III</b> | 2         | 2         | 1         |
| <b>Profit</b>    | \$18      | \$12      | \$15      |

How many units of each product should the company produce to maximize its profit? What is the largest profit the company can realize? Are there any resources left over?