

## 9.2.1: Maximization By The Simplex Method (Exercises)

### SECTION 9.2 PROBLEM SET: MAXIMIZATION BY THE SIMPLEX METHOD

Solve the following linear programming problems using the simplex method.

1)

$$\begin{array}{ll}\text{Maximize} & z = x_1 + 2x_2 + 3x_3 \\ \text{subject to} & x_1 + x_2 + x_3 \leq 12 \\ & 2x_1 + x_2 + 3x_3 \leq 18 \\ & x_1, x_2, x_3 \geq 0\end{array}$$

2)

$$\begin{array}{ll}\text{Maximize} & z = x_1 + 2x_2 + x_3 \\ \text{subject to} & x_1 + x_2 \leq 3 \\ & x_2 + x_3 \leq 4 \\ & x_1 + x_3 \leq 5 \\ & x_1, x_2, x_3 \geq 0\end{array}$$

3) A farmer has 100 acres of land on which she plans to grow wheat and corn. Each acre of wheat requires 4 hours of labor and \$20 of capital, and each acre of corn requires 16 hours of labor and \$40 of capital. The farmer has at most 800 hours of labor and \$2400 of capital available. If the profit from an acre of wheat is \$80 and from an acre of corn is \$100, how many acres of each crop should she plant to maximize her profit?

### SECTION 9.2 PROBLEM SET: MAXIMIZATION BY THE SIMPLEX METHOD

Solve the following linear programming problems using the simplex method.

4) A factory manufactures chairs, tables, and bookcases each requiring the use of three operations: Cutting, Assembly, and Finishing. The first operation can be used at most 600 hours; the second at most 500 hours; and the third at most 300 hours. A chair requires 1 hour of cutting, 1 hour of assembly, and 1 hour of finishing; a table needs 1 hour of cutting, 2 hours of assembly, and 1 hour of finishing; and a bookcase requires 3 hours of cutting, 1 hour of assembly, and 1 hour of finishing. If the profit is \$20 per unit for a chair, \$30 for a table, and \$25 for a bookcase, how many units of each should be manufactured to maximize profit?

5). The Acme Apple company sells its Pippin, Macintosh, and Fuji apples in mixes. Box I contains 4 apples of each kind; Box II contains 6 Pippin, 3 Macintosh, and 3 Fuji; and Box III contains no Pippin, 8 Macintosh and 4 Fuji apples. At the end of the season, the company has altogether 2800 Pippin, 2200 Macintosh, and 2300 Fuji apples left. Determine the maximum number of boxes that the company can make.

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