

9.4: Chapter Review

SECTION 9.4 PROBLEM SET: CHAPTER REVIEW

Solve the following linear programming problems using the simplex method.

1)	Maximize $z = 5x_1 + 3x_2$ subject to $x_1 + x_2 \leq 12$ $2x_1 + x_2 \leq 16$ $x_1 \geq 0; x_2 \geq 0$	2)	Maximize $z = 5x_1 + 8x_2$ subject to $x_1 + 2x_2 \leq 30$ $3x_1 + x_2 \leq 30$ $x_1 \geq 0; x_2 \geq 0$
3)	Maximize $z = 2x_1 + 3x_2 + x_3$ subject to $4x_1 + 2x_2 + 5x_3 \leq 32$ $2x_1 + 4x_2 + 3x_3 \leq 28$ $x_1, x_2, x_3 \geq 0$	4)	Maximize $z = x_1 + 6x_2 + 8x_3$ subject to $x_1 + 2x_2 \leq 1200$ $2x_2 + x_3 \leq 1800$ $4x_1 + x_3 \leq 3600$ $x_1, x_2, x_3 \geq 0$
5)	Maximize $z = 6x_1 + 8x_2 + 5x_3$ subject to $4x_1 + x_2 + x_3 \leq 1800$ $2x_1 + 2x_2 + x_3 \leq 2000$ $4x_1 + 2x_2 + x_3 \leq 3200$ $x_1, x_2, x_3 \geq 0$	6)	Minimize $z = 12x_1 + 10x_2$ subject to $x_1 + x_2 \geq 6$ $2x_1 + x_2 \geq 8$ $x_1 \geq 0; x_2 \geq 0$
7)	Minimize $z = 4x_1 + 6x_2 + 7x_3$ subject to $x_1 + x_2 + 2x_3$ $x_1 + 2x_2 + x_3 \geq 30$ $x_1, x_2, x_3 \geq 0$	8)	Minimize $z = 40x_1 + 48x_2 + 30x_3$ subject to $2x_1 + 2x_2 + x_3 \geq 25$ $x_1 + 3x_2 + 2x_3 \geq 30$ $x_1, x_2, x_3 \geq 0$

9) An appliance store sells three different types of ovens: small, medium, and large. The small, medium, and large ovens require, respectively, 3, 5, and 6 cubic feet of storage space; a maximum of 1,000 cubic feet of storage space is available. Each oven takes 1 hour of sales time; there is a maximum of 200 hours of sales labor time available for ovens. The small, medium, and large ovens require, respectively, 1, 1, and 2 hours of installation time; a maximum of 280 hours of installer labor for ovens is available monthly.

If the profit made from sales of small, medium and large ovens is \$50, \$100, and \$150, respectively, how many of each type of oven should be sold to maximize profit, and what is the maximum profit?

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10) A factory manufactures three products, A, B, and C. Each product requires the use of two machines, Machine I and Machine II. The total hours available, respectively, on Machine I and Machine II per month are 180 and 300. The time requirements and profit per unit for each product are listed below.

	A	B	C
Machine I	1	2	2
Machine II	2	2	4
Profit	20	30	40

How many units of each product should be manufactured to maximize profit, and what is the maximum profit?

11) A company produces three products, A, B, and C, at its two factories, Factory I and Factory II. Daily production of each factory for each product is listed below.

	Factory I	Factory II
Product A	10	20
Product B	20	20
Product C	20	10

The company must produce at least 1000 units of product A, 1600 units of B, and 700 units of C. If the cost of operating Factory I is \$4,000 per day and the cost of operating Factory II is \$5000, how many days should each factory operate to complete the order at a minimum cost, and what is the minimum cost?

12) For his classes, Professor Wright gives three types of quizzes, objective, recall, and recall-plus.

To keep his students on their toes, he has decided to give at least 20 quizzes next quarter.

The three types, objective, recall, and recall-plus quizzes, require the students to spend, respectively, 10 minutes, 30 minutes, and 60 minutes for preparation, and Professor Wright would like them to spend at least 12 hours(720 minutes) preparing for these quizzes above and beyond the normal study time.

An average score on an objective quiz is 5, on a recall type 6, and on a recall-plus 7, and Dr. Wright would like the students to score at least 130 points on all quizzes.

It takes the professor one minute to grade an objective quiz, 2 minutes to grade a recall type quiz, and 3 minutes to grade a recall-plus quiz.

How many of each type should he give in order to minimize his grading time?

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