MIG

**SAVE THIS FILE AS: U4PREREQ2**

**Unit 4 Prerequisite 2** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Minimization Solving and Answering in Sentence form

1. A school is preparing a trip for 400 students. The company who is providing the transportation has 10 large buses that can carry 50 students each and 8 small buses that can each carry 40 students. However, there are only 9 drivers available. The rental cost for a large bus is $800 and $600 for the small bus. Calculate how many buses of each type should be used for the trip for the least possible cost.

Decision Variables: Constraints:

Objective function:

Optimal Solution: Minimum Value:

Sentence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. A small firm makes three similar products, which all follow the same three-step process, consisting of milling, inspection, and drilling. Product A requires 9 minutes of milling, 5 minutes for inspection, and 10 minutes of drilling per unit; product B requires 10 minutes of milling, 6 minutes for inspection, and 8 minutes of drilling per unit; and product C requires 8 minutes of milling, 10 minutes for inspection, and 16 minutes of drilling. In order to keep from downsizing the firm has to use more than 20 hours during the next week for milling, 15 hours for inspection, and 24 hours for drilling. However, because of market demand, the firm limits their production to a total of 131 products per week. Product A costs $2.40 per unit, B costs $2.50 per unit, and C costs $3.00 per unit. Determine the optimal mix of products in terms of minimizing cost for the week.

Decision Variables: Constraints:

Objective function:

Optimal Solution: Minimum Value:

Sentence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. The Grand Valley Company, run by the J. Motwani family, produces two products: bed mattresses at a cost of $20 each and box springs at a cost of $24 each. A prior contract requires that the firm produce at least 30 mattresses or box springs, in any combination, per week. In addition, union labor agreements demand that stitching machines be kept running at least 40 hours per week, which is one production period. They also received an order of 15 box springs this week that they need to fill in addition to their normal production. If each box spring takes 2 hours to stitch and each mattress takes 1 hour to stitch what would be the optimal mix to minimize costs of the company?

Decision Variables: Constraints:

Objective function:

Optimal Solution: Minimum Value:

Sentence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. A biologist needs at least 40 fish for her experiment. She cannot use more than 25 perch fish or more than 30 bass fish. Each perch costs $5 and each bass costs $3. How many of each fish should she use in order to minimize the cost?

Decision Variables: Constraints:

Objective function:

Optimal Solution: Minimum Value:

Sentence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. In order to ensure optimal health (and thus accurate test results), a lab technician needs to feed the rabbits a daily diet containing a minimum of 24 grams (g) of fat, 36 g of carbohydrates, and 4 g of protein. But the rabbits should be fed no more than 5 ounces of food a day.

Rather than order rabbit food that is custom-blended, it is cheaper to order Brand A and Brand B, and blend them for an optimal mix. Brand A contains 8 g of fat, 12 g of carbohydrates, and 2 g of protein per ounce, and costs $0.30 per ounce. Brand B contains 12 g of fat, 12 g of carbohydrates, and 1 g of protein per ounce, at a cost of $0.20 per ounce.

What is the optimal blend that would minimize the cost?

Decision Variables: Constraints:

Objective function:

Optimal Solution: Minimum Value:

Sentence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Your club plans to raise money by selling two sizes of fruit baskets. The plan is to buy small baskets for $10 and sell them for a profit of $6 and to buy large baskets for $15 and sell them for a profit of $10. The club president purchased 200 of the small baskets and 80 of the large baskets to sell. Your club needs to sell enough baskets to cover their expenses of $1400. Find the number of small and large fruit baskets you must sell in order to minimize the cost.

Decision Variables: Constraints:

Objective function:

Optimal Solution: Minimum Value:

Sentence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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