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:

Objective function:

Constraints:

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

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1. A hospital chef wants to create a healthy dish containing soybeans, meats, and grains. One gram of soybean meal provides 2.5 units of vitamins and 5 calories. One gram of meat provides 4.5 units of vitamins and 3 calories. One gram of grain provides 5 units of vitamins and 10 calories. However, regulations limit the amount of meat and grain to 20 grams. Additionally, the recipe limits the amounts of soybeans, meat, and grain to at most 25 grams. If a gram of soybeans costs 7 cents, a gram of meat costs 9 cents, and a gram of grain costs 11 cents. What mixture of these ingredients will provide at least 110 units of vitamins and 155 calories at a minimum cost?

Decision Variables:

Objective function:

Constraints:

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

1. A researcher needs at least 40 subjects for her experiment. She cannot use more than 25 adults or more than 30 students. Each adult costs the researcher $50 and each student costs $30. How many subjects of each should she use in order to minimize the cost?

Decision Variables:

Objective function:

Constraints:

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

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1. A patient in a hospital is required to have at least 84 units of drug A and 120 units of drug B each day. Each gram of substance M contains 10 units of drug A and 8 units of drug B, and each gram of substance N contains 2 units of drug A, and 4 units of drug B. Substance M is also highly expensive which means not more than 10 grams of it may be used. Unfortunately, both M and N contain an undesirable drug C, 3 units per gram in M and 4 units per gram in N. How many grams of substances M and N should be mixed to meet the minimum daily requirements at the same time minimize the intake of drug C? What would be the minimum amount of drug C preset in the mixture?

Decision Variables:

Objective function:

Constraints:

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

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

Decision Variables:

Objective function:

Constraints:

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

1. In order to ensure optimal health cancer patients must be fed a diet containing a minimum of 480 grams of fat, 720 grams of carbohydrates, and 80 grams of protein every meal. But they should be fed no more than 25 ounces of food at a time.

Rather than order 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 40 g of fat, 60 g of carbohydrates, and 10 g of protein per ounce, and costs $15 per ounce. Brand B contains 60 g of fat, 60 g of carbohydrates, and 5 g of protein per ounce, at a cost of $10 per ounce.

What is the optimal blend that would minimize the cost?

Decision Variables:

Objective function:

Constraints:

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

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