MIG Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Unit 4 Prerequisite 1**

Minimization –Practice

1. Miss Keller is making sandwiches for an event. She will make ham sandwiches, turkey sandwiches, and deluxe sandwiches (which have both ham and turkey). Due to her busy schedule, Miss Keller has only 500 minutes to make sandwiches. A ham sandwich takes 3 minutes to put together and takes 4 slices of ham. A turkey sandwich takes 5 minutes to assemble and takes 4 pieces of turkey. The deluxe sandwich takes 9 minutes to assemble and takes 2 slices each of ham and turkey. All together Miss Keller has 350 pieces of ham and 150 pieces of turkey. There will be 100 people attending the event, but extra sandwiches are ALWAYS alright! Miss Keller also has 5 people that have preordered deluxe sandwiches. If it costs $5 to make a ham sandwich, $3 to make a turkey sandwich and $4 to make the deluxe sandwich; determine how many of each type of sandwich Miss Keller should make to minimize costs.

Decision Variables:

Objective Function:

Constraints:

1. A company is developing a new sofa for production in two of its most efficient factories. Each day factory A can produce 200 sofas, and factory B can produce 330 sofas. Altogether, the company projects a demand of at least 13,900 sofas to sell nationwide. Labor agreements with Factory A require it to be open at least 20 days but not more than 25 to allow for time off. However, factory B can run up to the full 30 days per month (on average). If Factory A costs $13,000 per day to operate and factory B costs $14,000 how many days should the company keep each factory open to minimize costs?

Decision Variables:

Objective Function:

Constraints:

1. Moran Chemicals produces two types of chemicals: Insecticide A and Herbicide B.

Insecticide A costs Moran $3,000 per ton; while Herbicide B costs $3,500 per ton. Moran's production superintendent has specified that at least 30 tons of Insecticide A and at least 20 tons of Herbicide B must be produced during the next month. Unfortunately, these chemicals don’t have a long shelf life so to prevent the loss of these expensive chemicals, Moran must limit production to 70 tons next month.

Decision Variables:

Objective Function:

Constraints:

1. A large institution is preparing lunch menus containing foods A and B. The specifications for the two foods are given in the following table. Each lunch must provide at least 12 units of fat per serving, no more than 8 units of carbohydrates, and at least 17 units of protein. The institution can purchase food A for $0.12 per ounce and food B for $0.08 per ounce. How many ounces of each food should a serving contain to meet the dietary requirements at the least cost?

|  |  |  |  |
| --- | --- | --- | --- |
| **Food** | **Units of Fat per Ounce** | **Units of Carbs  per Ounce** | **Units of Protein per Ounce** |
| **A** | **2** | **5** | **6** |
| **B** | **3** | **4** | **2** |

Decision Variables:

Objective Function:

Constraints:

1. Two brands of fertilizers ARE available: SuperGro & CropQuick. A farmer’s field requires at least 16 kgs of nitrogen and 24 kgs of phosphate. SuperGro costs $6 per bag and CropQuick costs $3 per bag. SuperGro has 2 kgs of nitrogen and 4 kgs of phosphate while CropQuick has 4 kgs of nitrogen and 3 kgs of phosphate. How much of each brand should the farmer buy to minimize total cost of fertilizer?

Decision Variables:

Objective Function:

Constraints:

1. Doctors currently recommend vitamins as a healthy supplement to a normal persons’ diet. The average adult male is recommended to consume at least 42 units of vitamin A, at least 8 units of vitamin B, and at least 50 units of vitamin C each day. Currently there are two main pills that dominate the market: Sunny Happy pills and Vitamax pills. Sunny Happy pills cost $0.10 each and contain 6 units of A, 1 unit of B, and 2 units of C. Vitamax pills cost $0.20 each and contain 3 units of A, 1 unit of B, and 7 units of C. How many pills of each type should one take to meet the recommended amount at a minimum costs?

Decision Variables:

Objective Function:

Constraints: