**ncsu_logo**

**BUS 443—Business Analytics**

**Linear Programming Assignment 2**

**Dahlby Outfitters: Covering Model**

Dahlby Outfitters wishes to introduce packaged trail mix as a new product. The ingredients for the trail mix are seeds, raisins, flakes, and two kinds of nuts. Each ingredient contains certain amounts of vitamins, minerals, protein, and calories. The marketing department has specified that the product be designed so that a certain minimum nutritional profile is met. **The decision problem is to determine the optimal product composition;** that is, to minimize the product cost by choosing the amount for each of the ingredients in the mix. The following data summarizes the parameters of the problem:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Component** | **Nutritional Requirement** | **Grams/Lb.**  **(Seeds)** | **Grams/Lb.**  **(Raisins)** | **Grams/Lb. (Flakes)** | **Grams/Lb. (Pecans)** | **Grams/Lb. (Walnuts)** |
| Vitamins | 20 | 10 | 20 | 10 | 30 | 20 |
| Minerals | 10 | 5 | 7 | 4 | 9 | 2 |
| Protein | 15 | 1 | 4 | 10 | 2 | 1 |
| Calories | 600 | 500 | 450 | 160 | 300 | 500 |
| Cost/Lb. |  | $4 | $5 | $3 | $7 | $6 |

We know that the model must decide the optimal product composition mix (the amount of each ingredient to put into a package of trail mix). Using S, R, F, P, and W to represent the number of pounds of each ingredient in a package, calculate the total cost of a particular composition as:

*Cost = 4S+5R+3F+7P+6W*

Our first constraint is:

*Vitamin content = 10S+20R+10F+30P+20W >=20 (Vitamin floor)*

What are the other constraints?

Write the entire model, stated in algebraic terms:

*Minimize z =*

*Subject to*

Now, we are ready to create the spreadsheet model to solve this business question. Now, open the Dahlby Outfitters Spreadsheet Model from Moodle and solve.