**Problem 2 – Dog Breeder**

A large breeder of a particular type of dog wishes to determine the quantities of available types of dog food that he should stock so that he can be assured that his dogs meet their nutritional requirements, but at the least cost possible. He has decided that he can do this by deciding the requirements of each type of feed for a single dog during one day of operation (he will multiply by the number of days and number of dogs later). The number of units of each type of basic nutritional ingredient contained within a kilogram of each feed type is given in the following table, along with the daily nutritional requirements. The feed costs per kilogram are shown on the bottom row.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nutritional Ingredient | Corn based feed | Animal product based feed | Vegetable protein based fee | Minimum Daily Requirement |
| Carbohydrates | 90 | 20 | 40 | 200 |
| Protein | 30 | 80 | 60 | 180 |
| Vitamins | 10 | 20 | 60 | 150 |
| Cost ($) | $4.20 | $3.60 | $3.00 |  |

1. Define the decision variables (and give them names like x, y, z, etc. using as many variables, and names, as you need; also provide units for each).
2. Define the constraints using the variables you defined.
3. Using the variables you defined, define the objective function and whether you want to maximize or minimize it.
4. Implement your model in Excel – what is the optimal solution (please specify the both the value of your decision variables and your objective function).

Include a readable printout of your model, showing both formulas and row and column headings as **Exhibit 2-A**.

1. Suppose there were a vitamin pill available that provides 10 units of vitamin, and costs $.10 per pill. Without solving the model again, would you consider buying these?

Why or why not (base your argument on the optimal solution only)? 

1. A dietary food supplier is offering you protein powder on the cheap and is willing to negotiate the price. You figure $.5 per unit of protein may be a reasonable price. Augment your model to take this into account. Would you buy any protein powder at this price point?  
     
     
     
   Include a readable printout of your augmented model, showing both formulas and row and column headings as **Exhibit 2-B**
2. Run a SolverTable on the price of unit of protein powder. Identify your walk-away-point (the price point when you would be indifferent between buying the protein from the food supplier and the status quo).

What is your walk-away price?

Include a readable printout of your table as **Exhibit 2-C.**