BAN 501 Assignment 1

1. Golding Landscaping and Plants, Inc. (Ans: Objective Function Value $3.35)

Kenneth and Patricia Golding spent a career as a husband-and-wife real estate investment partnership in Washington, DC. When they finally retired to a 25-acre farm in northern Virginia's Fairfax County, they became ardent amateur gardeners. Kenneth planted shrubs and fruit trees, and Patricia spent her hours potting all sizes of plants. When the volume of shrubs and plants reached the point that the Goldings began to think of their hobby in a serious vein, they built a greenhouse adjacent to their home and installed heating and watering systems.

By 2005, the Goldings realized that their retirement from real estate had really only led to a second career—in the plant and shrub business—and they filed for a Virginia business license. Within a matter of months, they asked their attorney to file incorporation documents and formed the firm Golding Landscaping and Plants, Inc.

Early in the new business's existence, Kenneth Golding recognized the need for a high-quality commercial fertilizer that he could blend himself, both for sale and for his own nursery. His goal was to keep his costs to a minimum while producing a top-notch product that was especially suited to the northern Virginia climate.

Working with chemists at George Mason University, Golding blended "Golding-Grow." It consists of four chemical compounds: C-30, C-92, D-21, and E-11. The cost per pound for each compound is indicated in the following table:

Chemical Compound	**Cost Per Pound ($)**
C-30	0.12
C-92	0.09
D-21	0.11
E-11	0.04

The specifications for Golding-Grow are as follows:

a. Chemical E-11 must comprise at least 15% of the blend.
b. C-92 and C-30 must together constitute at least 45% of the blend.
c. D-21 and C-92 can together constitute no more than 30% of the blend.
d. Golding-Grow is packaged and sold in 50-pound bags.

1. Formulate an LP problem to determine what blend of the four chemicals will allow Golding to minimize the cost of a 50-pound bag of the fertilizer.
2. Solve by using Excel to find the best solution.

2. ***A Blending Problem (Objective Value 3.97)***

A 16-ounce can of Spotted Owl food must contain protein, carbohydrate, and fat in at least the following amounts:

1. Protein: 48 grams
2. Carbohydrate: 84 grams
3. Fat: 64 grams

Four types of food mix are available to be blended together in various proportions to produce a least-cost can of owl food satisfying these requirements. The contents per ounce and prices per ounce of each mix are given in the table:

Mix Number:	1	2	3	4
Price per ounce:	$0.25	$0.38	$0.18	$0.33
Protein (gm/oz.):	3	5	2	3
Carbohydrate (gm/oz.):	7	4	2	8
Fat (gm/oz.):	5	6	6	2

Each 16 ounce can must be filled with a combination of only these 4 mixes. Formulate and solve this blending problem as a linear programming problem.

3.Staff Scheduling (Optimal Objective value: 1456)

The director of the computer center for a college is responsible for scheduling the center's staff. The center is open from 8 am until midnight. The director has monitored the usage of the center at various intervals throughout the day and determined that the following numbers of computer consultants are required.

Time of Day	Minimum number of Consultants Required
8 am - noon	4
noon - 4 pm	8
4 pm - 8 pm	10
8 pm - midnight	6

Full-time and part-time consultants can be hired. The full-time consultants work for eight consecutive hours in any of the following shifts: morning (8 am - 4 pm), afternoon (noon - 8 pm), and evening (4 pm - midnight). Full-time consultants are paid $14 per hour. Part-time consultants can be hired to work any of the four shifts listed in the table. Part-time consultants are paid $12 per hour. An additional requirement is that during every time period, at least one full-time consultant must be on duty for every part-time consultant on duty (read as the number of full time consultants must be at least as much as the part time consultants). Determine a minimum-cost staffing plan for the center