LP Formulation Problems

Formulate a linear programming model for the following problems:

- 1. A furniture firm manufactures two products, benches and picnic tables, for use in yards and parks. The firm has two main resources: its carpenters (labor force) and a supply of redwood for use in the furniture. During the next production cycle, 1,200 hours of labor are available. The firm also has a stock of 3,500 feet of good-quality redwood. Each bench that firm produces requires 4 labor hours and 10 feet of redwood; each picnic table takes 6 labor hours and 35 feet of redwood. Completed benches will yield a profit of \$9 each, and tables will result in a profit of \$20 each. How many benches and tables should the firm produce to obtain the largest possible profit?
- 2. A pet food company produces a low-calorie dog food for overweight dogs. This product is made from beef products and grain. Each pound of beef costs \$0.90, and each pound of grain costs \$0.60. A pound of the dog food must contain at least 9 units of Vitamin 1 and 10 units of Vitamin 2. A pound of beef contains 10 units of Vitamin 1 and 12 units of Vitamin 2. A pound of grain contains 6 units of Vitamin 1 and 9 units of Vitamin 2. How many pounds of beef and grain should be included in each pound of dog food to minimize the cost?
- 3. The Chairman of the Department of Industrial Engineering must plan the school's course offerings for the fall semester. Student demands make it necessary to offer at least 30 undergraduate and 20 graduate courses in the term. Faculty contracts also dictate that at least 60 courses be offered in total. Each undergraduate course taught costs the college an average of \$2,500 in faculty wages, and each graduate course costs \$3,000. How many undergraduate and graduate courses should be taught in the fall so that total faculty salaries are kept to a minimum?
- 4. You need to buy some filing cabinets. You know that Cabinet X costs \$10 per unit, requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y costs \$20 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. You have been given \$140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets. How many of which model should you buy, in order to maximize storage volume?