IE 311
Thursday 16/4/1436 H

LP Formulation Problems

Formulate a linear programming model for the following problems:

1. 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?

2. A manufacturer is beginning the last week of production of four different models of wooden television consoles, labeled I, II, III, IV, each of which must be assembled and then decorated. The models require 4, 5, 3, and 5 h, respectively, for assembling and 2, 1.5, 3, and 3 h, respectively, for decorating. The profits on the models are $7, $7, $6, and $9, respectively. The manufacturer has 30,000 h available for assembling these products and 20,000 h available for decorating. How many of each model should the manufacturer produce during this last week to maximize profit? Assume that all units made can be sold.

3. 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?

4. At a certain refinery, the refining process requires the production of at least two gallons of gasoline for each gallon of fuel oil. To meet the anticipated demands of winter, at least three million gallons of fuel oil a day will need to be produced. The demand for gasoline, on the other hand, is not more than 6.4 million gallons a day. If gasoline is selling for $1.90/gal and fuel oil sells for $1.50/gal, how much of each should be produced in order to maximize revenue?

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