

Revision Questions

Question 1

The Mifflinburg Bank and Trust Co. has three branches. The bank's management is interested in evaluating the efficiency of each branch and has hired you as a technical consultant to help them with their evaluations. The two inputs used by each branch include the following: input 1, supplies used per month (measured in dollars); and input 2, labor used per month (measured in hundreds of hours). The outputs produced by each branch are as follows: output 1, the number of checks processed per month (in thousands); output 2, the number of loan applications per month (in hundreds); and output 3, the number of deposits processed per month (in thousands). The inputs and outputs for these bank branches are given in the file **Problem04_26A.xls**. Formulate a linear programming model in the given Excel spreadsheet to determine whether any of these branches are efficient.

Question 2

A company manufactures its most popular product at three plants. Customers located in four different cities demand this product. The cost of producing one unit of the product at each plant and shipping it to each of the cities is given in the file **Problem05_02A.xls**. Moreover, the capacity of each plant and the demand of the customers in each city are also provided in this file. The company wants to determine the least-cost method for meeting the demands of their customers across the four cities. Unfortunately, the company does not currently have enough production capacity to meet the demands at all four cities. Assume that there is a penalty cost for each unit of unsatisfied demand. In particular, the penalty costs for each unit of unmet demand are as follows: at city 1, \$200 per unit; at city 2, \$225 per unit; at city 3, \$260 per unit; at city 4, \$300 per unit. Formulate and solve an appropriate linear network model in the file **Problem05_02A.xls**.

Question 3

Bloomington Publishers is considering publishing five different textbooks. The maximum number of copies of each textbook that can be sold, the variable cost of producing each textbook, the sales price of each textbook, and the fixed cost of a production run for each textbook are given in the file **Problem06_05A.xls**. For example, producing and selling 2000 copies of book 1 yields a revenue of $\$80(2000) = \$160,000$ but costs $\$80,000 + \$44(2000) = \$168,000$. This company can produce at most 20,000 copies in total. Furthermore, it can publish no more than three different types of textbooks. Also, it knows that it cannot publish book 1 if it chooses to publish book 2. Finally, if this company publishes book 4 it must also publish book 5. Bloomington Publishers wants to find a production plan that maximizes total profit. Formulate and solve an integer programming model in **Problem06_05A.xls** to help this publisher identify the best production plan.