Topic 3 - Exercise

Problem 1.

You are moving from New Jersey to Indiana and have rented a truck that can haul up to 1100 cubic feet of furniture. The volume and value of each item you are considering moving on the truck are given in the file "**Problem 1.xlsx**". Which items should you bring to Indiana to maximize the total value of the items carried by the truck?

Problem 2.

A manufacturer can sell product 1 at a profit of $20 per unit and product 2 at a profit of $40 per unit. Three units of raw material are needed to manufacture one unit of product 1, and six units of raw material are needed to produce one unit of product 2. A total of 15,000 units of raw material are available. If any product 1 is produced, a setup cost of $20,000 is incurred; if any product 2 is produced, a setup cost of $35,000 is incurred.

How can the manufacturer maximize its profit?

Problem 3.

State University must purchase 1100 computers from three vendors. Vendor 1 charges $500 per computer plus a total delivery charge of $5000. Vendor 2 charges $350 per computer plus a total delivery charge of $4000. Vendor 3 charges $250 per computer plus a total delivery charge of $6000. Vendor 1 will sell the university at most 500 computers, vendor 2, at most 900, and vendor 3, at most 400. The minimum order from any vendor is 200 computers. Determine how to minimize the cost of purchasing the needed computers. Make sure the solution is integer.

Problem 4.

The State of Texas frequently audits companies doing business in Texas. Because these companies often have headquarters located outside the state, auditors must be sent to out-of-state locations. Each year, auditors must make 500 trips to cities in the Northeast, 400 trips to cities in the Midwest, 300 trips to cities in the West, and 400 trips to cities in the South. Texas is considering basing auditors in Chicago, New York, Atlanta, and Los Angeles. The annual cost of basing auditors in any city is $100,000. The cost of sending an auditor from any of these cities to a given region of the country is given in the file "**Problem 4.xlsx**". Determine how to minimize the annual cost of conducting out-of-state audits.