Worksheet

Lesson : 2. 4 : Linear programming

Name:……Class:……Date:……

Linear programming deals with the optimization (maximization or minimization) of linear functions subject to linear constraints.This technique has found its applications to important areas of product mix, blending problems and diet problems.Oil refineries, chemical industries, steel industries and food processing industry are also using linear programming with considerable success. Linear programming problems involving only two variables can be effectively solved by a graphical technique which provides a pictorial representation of the solution.

Step 1: Formulate the given problem as a linear programming problem.

Step 2: Plot the given constraints as equalities on x_1-x_2 coordinate plane and determine the convex region formed by them.

Step 3: Determine the vertices of the convex region and find the value of objective function at each vertex.The vertex which gives the optimal value of the objective function gives the desired optimal solution to the problem.

1) A transport company has two types of trucks, Type A and Type B. Type A has a refrigerated capacity of 20 m^3 and a non-refrigerated capacity of 40 m^3 while Type B has the same overall volume with equal sections for refrigerated and non-refrigerated stock. A grocer needs to hire trucks for the transport of 3,000 m^3 of refrigerated stock and 4,000 m^3 of non-refrigerated stock. The cost per kilometer of a Type A is $30, and $40 for Type B. How many trucks of each type should the grocer rent to achieve the minimum total cost?

2) **A school is preparing a trip for 400 students. The company who is providing the transportation has 10 buses of 50 seats each and 8 buses of 40 seats, but only has 9 drivers available. The rental cost for a large bus is $800 and $600 for the small bus. Calculate how many buses of each type should be used for the trip for the least possible cost.**

3) **A store wants to liquidate 200 of its shirts and 100 pairs of pants from last season. They have decided to put together two offers, A and B. Offer A is a package of one shirt and a pair of pants which will sell for $30. Offer B is a package of three shirts and a pair of pants, which will sell for $50. The store does not want to sell less than 20 packages of Offer A and less than 10 of Offer B. How many packages of each do they have to sell to maximize the money generated from the promotion?**

4) A calculator company produces a scientific calculator and a graphing calculator. Long-term projections indicate an expected demand of at least 100 scientific and 80 graphing calculators each day. Because of limitations on production capacity, no more than 200 scientific and 170 graphing calculators can be made daily. To satisfy a shipping contract, a total of at least 200 calculators much be shipped each day.

If each scientific calculator sold results in a $\$2$ loss, but each graphing calculator produces a $\$5$ profit, how many of each type should be made daily to maximize net profits?

5) **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?**