

Lesson #5 A: Using Linear Programming to help Solve Real World Linear Applications
(Reference: Lesson #54 in book)**Problem**

1. Use what you have learned about linear programming to minimize or maximize profits and costs in the following application problems given the constraints in each of the situations.
 1. 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?
 2. There is only 600 milligrams of a certain drug that is needed to make both large and small pills for small scale pharmaceutical distribution. The large tablets weigh 40 milligrams and the small ones weigh 30 milligrams. Consumer research determines that at least twice the amount of the smaller tablets are needed than the large ones and there needs to be at least three large tablets made. Each large tablet is sold for a profit of \$2 and the small tablet, \$1. How many tablets of each type have to be prepared to obtain maximum profit?
 3. A company makes two models of MP3 players. The M20 takes 3 hours to manufacture and the M25 takes 1 hour. The company has multiple shifts and has a 20-hour day for manufacturing the players. The M20 generates a profit of \$12, and the M25 a profit of \$7. The M20 uses 15 special chips, while the M25 uses 10. For the next manufacturing cycle, consisting of 36 days, there are 9,000 chips available. How many of each type of MP3 players should the company produce to maximize its profits?
 4. A caterer needs to prepare two different meals for a conference dinner. One is a chicken dish and the other is a seafood dish. The chicken dish costs \$2.50 to prepare and the seafood dish costs \$3.75. There will at most be 1000 people attending. Usually, twice as many people order chicken than do fish. How can the caterer keep costs to a minimum while still making sure that most people get their meal choice?
 5. A gold processor has two sources of gold ore, source A and source B. In order to keep his plant running, at least three tons of ore must be processed each day. Ore from source A cost \$20 per ton to process, and ore from source B costs \$10 per ton to process. Costs must be kept to less than \$80 per day. Moreover, Federal Regulations require that the amount of ore from source B cannot exceed twice the amount of ore from source A. If ore from source A yields 2 oz. of gold per ton, and ore from source B yields 3 oz. of gold per ton, how many tons of ore from both sources must be processed each day to maximize the amount of gold extracted subject to the above constraints?
 6. A rancher is mixing two types of food, Brand X and Brand Y, for his cattle. If each serving is required to have 60 grams of protein and 30 grams of fat, where Brand X has 15 grams of protein and 10 grams of fat and costs \$0.80 per unit, and Brand Y contains 20 grams of protein and 5 grams of fat, and costs \$0.50 per unit, how much of each type should be used to minimize the cost to the rancher?

Name: _____

ID: A

7. A store has requested a manufacturer to produce pants and sports jackets. For materials, the manufacturer has $750m^2$ of cotton textile and $1,000m^2$ of polyester. Every pair of pants (1 unit) needs $1m^2$ of cotton and $2m^2$ of polyester. Every jacket needs $1.5m^2$ of cotton and $1m^2$ of polyester. The price of the pants is fixed at \$50 and the jacket at \$40. What is the number of pants and jackets that the manufacturer must give the stores so that these items obtain a maximum sale?

8. A school is preparing for a trip for 400 students. The company who is providing the transportation has 10 buses of 50 seats 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 with the least possible cost.