

Assignment

Write

Describe linear programming in your own words.

Remember

The vertices of the solution region determined by a system of linear inequalities can be used to determine maximum and minimum values of linear expressions.

Practice

The Smartway Rental Car Company has \$180,000 to invest in the purchase of at most 16 cars of two different types, compact and full-size.

| | Purchase Price | Rental Fee | Maintenance Cost |
|---------------|----------------|------------|------------------|
| Compact Car | \$9000 | \$30 | \$8 |
| Full-Size Car | \$15,000 | \$48 | \$10 |

1. Due to demand, Smartway needs to purchase at least 5 compact cars.
 - a. Identify the constraints as a system of linear inequalities. Define your variables.
 - b. Graph the solution set for the system of linear inequalities. Label all points of the intersection of the boundary lines.
 - c. Smartway Rental Car's income comes from renting out their cars. How many of each type of car should they purchase if they want to maximize their income? What is the maximum income?
 - d. In order to keep up with their competitors, Smartway must purchase at least 3 full-size cars and at least 5 compact cars.

Identify the constraints as a system of linear inequalities. Define your variables.
 - e. Graph the solution set for this system of linear inequalities.
 - f. Smartway Rental is still unable to keep up with their competitors so they are going to try and cut their maintenance fees to save money. How many of each type of car should they purchase to minimize their maintenance fees?

Stretch

Some nutritional information for granola and yogurt is given in the table.

| | Protein (g) | Fiber (g) | Potassium (mg) | Calories |
|---------------------|-------------|-----------|----------------|----------|
| Granola (2 Tbsp) | 1.5 | 2 | 0 | 70 |
| Yogurt (3 oz) | 3 | 1.5 | 260 | 75 |

Reagan wants at least 10 grams of protein, 9 grams of fiber, 300 milligrams of potassium, and 250 calories from her breakfast.

1. Create a system of inequalities.
2. Graph your system.
3. Determine the intersection points of your boundary lines.
4. What is the cheapest Reagan can eat breakfast that meets her requirements if granola is \$0.34 per serving and yogurt is \$0.50 per serving? (Use only full serving sizes, always round the serving up.)

Review

1. Solve each linear inequality.
 - a. $-2(x + 1) + 4 < 8$
 - b. $20 - 2x > -2(x + 2) + 4x$
2. Declan is moving and needs to rent a truck for a day. Company A charges \$70 a day and \$0.99 per mile. Company B charges \$100 a day and \$0.75 per mile after the first 20 miles.
 - a. Create a system of equations to model the situation.
 - b. For what amount of miles does Company A make more sense? Company B?
3. Tessa has three daughters. Her 8-year-old weighs 60 pounds, her 6-year-old weighs 45 pounds, and her 2-year-old weighs 25 pounds.
 - a. Write the equation of the regression line for the data.
 - b. Use the equation to predict how much Tessa's 4-year-old niece weighs.