

MTH245 Homework 5

This homework is paper and pencil! Be neat, label everything, and graph paper is recommended.

1. Moe feeds his cat two types of food each day, canned and dry, each day. The canned food costs \$0.35 an ounce and the dry food costs \$0.25 an ounce. Let c stand for the number of ounces of canned food, d for the number of ounces of dry food and C for the total daily cost of feeding Moe's cat.

a. If Moe feeds his cat 3 ounces of canned food and 4 ounces of dry food on Monday, how much would it cost?

b. Write a formula for the $C = \$2$ cost isoline in terms of c and d .

c. Draw a graph of a family of isolines. Use at least 3 different values for the cost.

2. A large company plans to send 224 of its employees to a conference and will need to put them up in a hotel. The hotel has 2-person rooms available for \$120 and 3-person rooms for \$150. How many of each type of room should be reserved if the company wants to stay on budget with \$12,000?

3. A coffee house makes its own house blend from a mixture of Kona and Sumatra beans. Kona beans cost \$5 a pound and Sumatra costs \$4 a pound. Each pound of the house blend costs \$4.50. What percent of the blend is Kona and what percent is Sumatra?

4. Graph the system of inequalities. Locate the region on your graph that is the solution and find its corner points.

$$\begin{aligned}3x + 6y &\geq 6 \\2x + y &\leq 8 \\x, y &\geq 0\end{aligned}$$

5. Graph the system of inequalities. Locate the region on your graph that is the solution and find its corner points.

$$\begin{aligned}x + 2y &\leq 50 \\5x + 4y &\leq 145 \\2x + y &\geq 25 \\x, y &\geq 0\end{aligned}$$

6. Use your results from question 5 to find the corner point that **maximizes** $P = 3x + 4y$, subject to the constraints:

$$\begin{aligned}x + 2y &\leq 50 \\5x + 4y &\leq 145 \\2x + y &\geq 25 \\x, y &\geq 0\end{aligned}$$

7. Graph the given inequalities and find the corner point that **minimizes** $C = 10x + 15y$

$$\begin{aligned}x + y &\geq 10 \\3x + y &\geq 12 \\-2x + 3y &\geq 3 \\x, y &\geq 0\end{aligned}$$

8. Jumbo Java sells two different coffee blends: House blend and Gourmet blend. The House blend is 90% Antigua and 10% Kona and it sells for \$10 a pound while the Gourmet blend is 80% Antigua and 20% Kona, and it sells for \$11 a pound. Jumbo Java has a limited amount of Antigua and Kona beans on hand. How many pounds of the two blends should they mix to maximize revenue if they have 72 pounds of Antigua beans and 10 pounds of Kona on hand?

9. Suppose Jumbo Java changes the prices on its blends but is still subject to the same constraints on the amount of Antigua and Kona. Would the solution you found for problem 8 change--and if so to what--if the prices were:

- House blend \$10 and Gourmet \$15
- House blend \$13 and Gourmet \$11
- House blend \$10 and Gourmet \$20
- House blend \$10 and Gourmet \$8.50

(Hint: Using your corner points from #8, substitute each corner point into each of the revised revenue equations for parts a, b, c and d. Did the corner point that was the optimal solution change for any of these new models?)