



I'm not a robot



Open

Algebra awesomeness answers linear programming word problems

$$\begin{aligned}x &\geq 0 \\15x + 12y &\leq 90 \\12y &\leq 90 \\y &\leq \frac{90}{12} = \frac{15}{2} = 7.5 \\(0, 7.5)\end{aligned}$$

II. Finding the optimization points

Example: Objective function: $.5x + .2y = P$

Constraints:

$$\begin{aligned}x + y &\leq 90 \\x &\leq 60 \\y &\leq 80 \\x &\geq 0 \\y &\geq 0\end{aligned}$$

What combination of x and y -- subject to the constraints -- would maximize P ?

Test each corner point in the objective function:

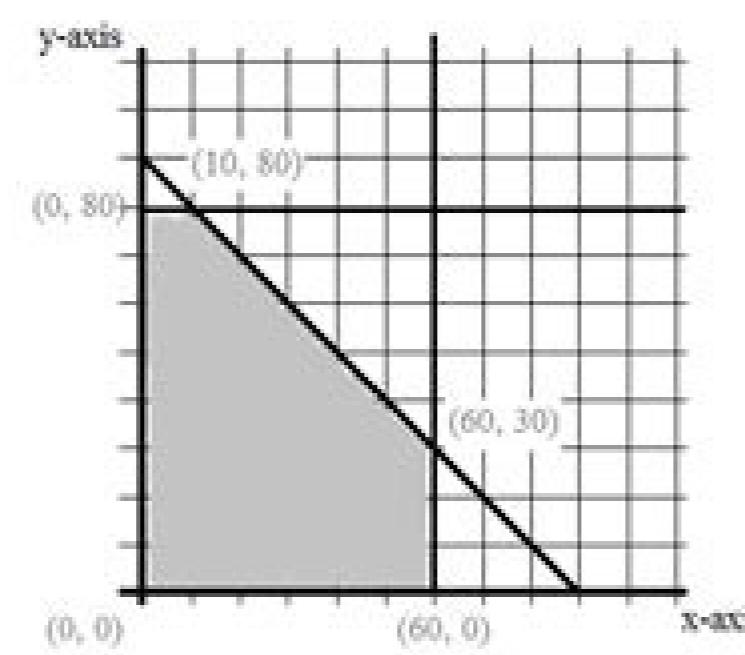
$$(0, 0) : .5(0) + .2(0) = 0$$

$$(0, 80) : .5(0) + .2(80) = 16$$

$$(10, 80) : .5(10) + .2(80) = 21$$

$$(60, 30) : .5(60) + .2(30) = \boxed{36}$$

$$(60, 0) : .5(60) + .2(0) = 30$$

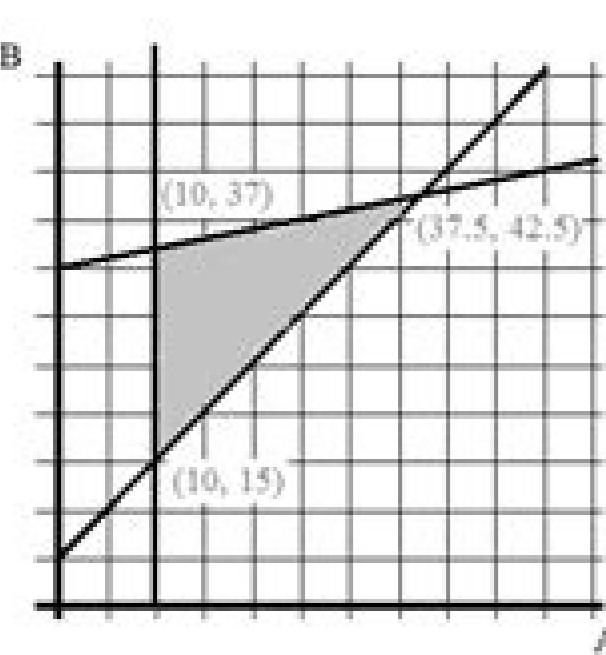


Example: Objective function: $40A + 25B = C$

Constraints:

$$\begin{aligned}A &\geq 10 \\B &\geq A + 5 \\-A + 5B &\leq 175\end{aligned}$$

What is the minimum cost subject to the constraints?



Find corner points:

$$A = 10$$

$$B = A + 5$$

$$(10, 15)$$

$$A = 10$$

$$-A + 5B = 175$$

$$-10 + 5B = 175$$

$$5B = 185$$

$$(10, 37)$$

$$B = A + 5$$

$$-A + 5B = 175$$

(use substitution)

$$-A + 5(A + 5) = 175$$

$$-A + 5A + 25 = 175$$

$$4A = 150$$

$$A = 37.5$$

$$B = 42.5$$

$$(37.5, 42.5)$$

$$(10, 37) : 40(10) + 25(15) = 775$$

$$(10, 37) : 40(10) + 25(37) = 1325$$

$$(37.5, 42.5) : 40(37.5) + 25(42.5) = 2562.5$$

Test each corner point:

c.) What concept or idea restricts you being able to buy EVERYTHING!!!!? (these create the constraints)

~~200~~ purchased 6

d.) Use the answer from (c.) to write 2 constraints

(inequalities) that represent the restrictions you have on your purchase.

$$\begin{aligned}x &= \# \text{ of jeans} & 25 \\y &= \# \text{ of dresses} & 25 \\x + y &\leq 6\end{aligned}$$

e.) There are two 'unwritten' restrictions that exist when we're working with money and product amounts, etc. Write these two restrictions.

$$\begin{aligned}x &\geq 0 \\y &\geq 0\end{aligned}$$

Exercise 8: Solving Linear Programming Problems

A pet shop owner has 100 rabbits. He has time for only 100 hrs. He can make \$12 per rabbit. He can make \$15 per hour. He can make the job

a) Write the inequality that represents the total number of pets.

b) Write the inequality that represents the total profit.

c) Graph the system of inequalities.

d) What are some possible solutions for the system?

$$\begin{cases} \text{Let } x = \# \text{ of turtles to farm} \\ \text{Let } y = \# \text{ of rabbits to farm} \end{cases}$$

$$\begin{cases} \text{Defining variables} \\ \text{I (turtles)}: x + y \leq 100 \\ \text{I (rabbits)}: 10x + 30y \geq 1500 \end{cases}$$

$$\begin{cases} \text{the method} \\ \text{use graphing, find} \\ \text{zone of feasibility} \\ ; \text{critical points} \\ \text{TEST ?} \end{cases}$$

C) A furniture store makes two types of chairs: rockers and swivels. Machines A and B are required to make each type of chair. Machine A can be run no longer than 20 hours in a day. Machine B is limited to 10 hours per day.

The following table shows the time needed to produce each chair and the profit.

Chair	Machine A	Machine B	Profit
Rocker	2 hours	3 hours	\$12
Swivel	4 hours	1 hour	\$10

How many of each chair should be made each day to maximize profits?



D) Given the following constraints, determine the maximum and minimum values of $Z = 2x - 3y$

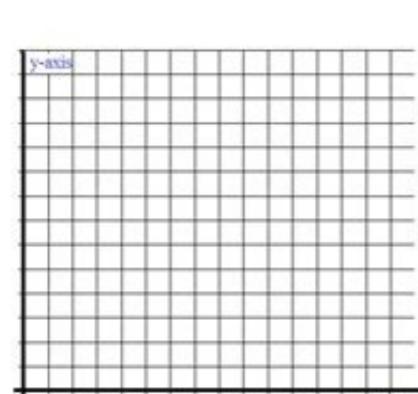
$$x \geq 0$$

$$y \geq 0$$

$$y \leq 3x + 4$$

$$x + 2y \leq 5$$

$$x - \frac{1}{3}y \leq 5$$



The shaded areas will be where the equation $Z = 2x - 3y$ works; in other words, where the solutions are. When we have $y = 3x + 4$ Since we are graphing a vertical line Dado que tenemos la desigualdad y

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