

LINEAR PROGRAMMING

Find max. & min values of f
 $f(x,y) = 8x + 5y$

Constraints:

$$3x + 2y \leq 18$$

$$0 + 0 \leq 18 \quad T$$

$$3x + 4y \leq 24$$

$$0 + 0 \leq 24 \quad T$$

$$x \geq 0$$

$$y \geq 0$$

$$\begin{array}{c|c} 6 & 0 \\ \hline 0 & 9 \end{array}$$

$$\begin{array}{c|c} 8 & 0 \\ \hline 0 & 6 \end{array}$$

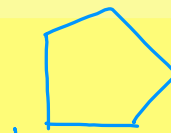
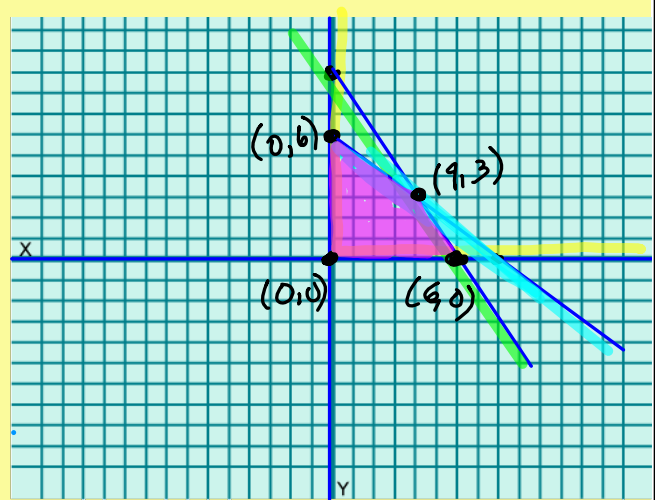
$$f(x,y) = 8x + 5y$$

$$f(0,0) = 8(0) + 5(0) = 0$$

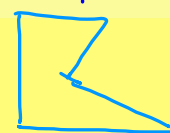
$$f(6,0) = 8(6) + 5(0) = 48$$

$$f(4,3) = 8(4) + 5(3) = 47$$

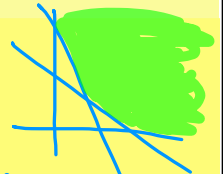
$$f(0,6) = 8(0) + 5(6) = 30$$



has max & min



may have
max or min



may be
no solution

min value of 0 at (0,0)
 max value of 48 at (6,0)

LINEAR PROGRAMMING

Find max. + min values of
 $f(x,y) = 8x + 5y$ No max!

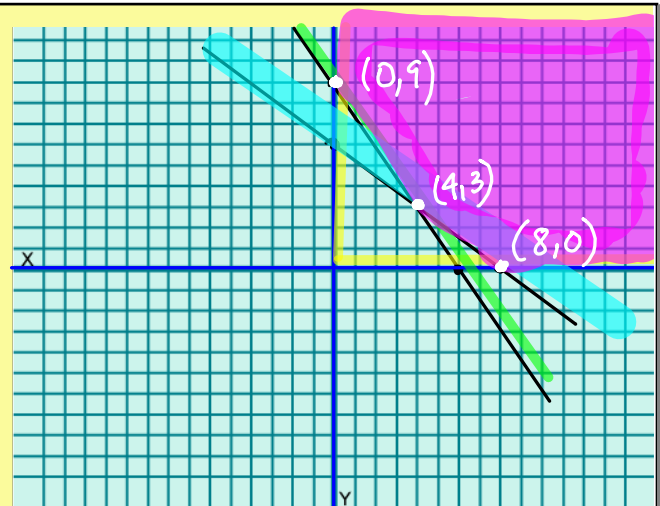
Constraints:

$$3x + 2y \geq 18$$

$$3x + 4y \geq 24$$

$$x \geq 0$$

$$y \geq 0$$



$$f(0,9) = 8(0) + 5(9) = 45$$

$$f(4,3) = 8(4) + 5(3) = 47$$

$$f(8,0) = 8(8) + 5(0) = 64$$

Min value of 45 at (0,9)

The owner of a coffee shop has decided to introduce two new blends of coffee in order to attract new customers--a *Deluxe Blend* and a *Savory Blend*. Each pound of the deluxe blend contains 30% Colombian and 20% Sumatran coffee, while each pound of the savory blend contains 35% Colombian and 15% Sumatran coffee (the remainder of each is made up of cheap and plentiful domestic varieties.) The profit on the deluxe blend will be \$1.25/lb, while the profit on the savory blend will be \$1.40/lb. How many pounds of each should the owner make in order to maximize profit if only 455 lb of Colombian coffee and 250 lb of Sumatran coffee are currently available?

	Col.	Sum.	Profit	
$x = \text{Deluxe lb.}$	30%	20%	1.25	
$y = \text{Savory lb.}$	35%	15%	1.40	
	455	250		

$x = \text{lbs. of Deluxe blend}$

$y = \text{lbs of Savory blend}$

Function - What is to be maximized or minimized

$$f(x, y) = 1.25x + 1.40y$$

Constraints:

$$x \geq 0, y \geq 0$$

$$0.30x + 0.35y \leq 455$$

$$0.20x + 0.15y \leq 250$$

Solve for y .

$$\cancel{0.35y} = \frac{455 - 0.3x}{0.35}$$

$$\frac{0.15y}{0.15} = \frac{250 - 0.2x}{0.15}$$

770 lb. of Deluxe blend
640 lb. of Savory blend
Profit \$1858.50

$$f(x, y) = 1.25x + 1.40y$$

$$f(0, 0) = 0$$

$$f(125, 0) = 1562.50$$

$$f(770, 640) = 1858.50 \quad * \text{Max}$$

$$f(0, 1300) = 1820$$