Fred's Coffee sells two blends of beans: Yusip Blend and Exotic Blend. Yusip Blend is one-half Costa Rican beans and one-half Ethiopian beans. Exotic Blend is one-quarter Costa Rican beans and three-quarters Ethiopian beans. Profit on the Yusip Blend is $3.50 per pound, while profit on the Exotic Blend is $4.00 per pound. Each day Fred receives a shipment of 200 pounds of Costa Rican beans and 330 pounds of Ethiopian beans to use for the two blends. How many pounds of each blend should be prepared each day to maximize profit? What is the maximum profit?

let x = number of pounds of yusip blend.

let y = number of pounds of exotic blend.

profit equation is:

profit = 3.5x + 4y

set up a table as follows:

	costa rican	ethiopean
yusip blend	.5	.5
exotic blend	.25	.75

your constraint equations are:

x >= 0

y >= 0

.5x + .25y <= 200

.5x + .75y <= 330

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to graph these equations, solve for y in those equations that have y in them to get;

$x >= 0$

$y >= 0$

$y <= (200 - .5x) / .25$ 800

$y <= (330 - .5x) / .75$ 440

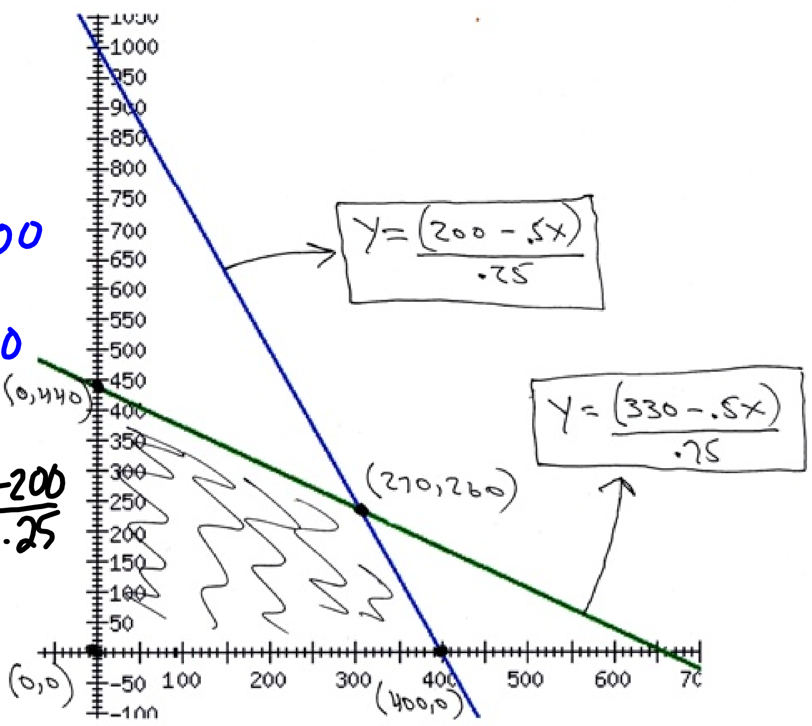
x = 0 is the same line as the y-axis.

y = 0 is the same line as the x-axis.

$y \leq -2x + 800$

$y \leq -\frac{2}{3}x + 440$

$\frac{.25y}{.25} \leq \frac{-.5x}{.25} + \frac{200}{.25}$



the shaded area is the area of on the graph that meets all the constraints.
this is called the region of feasibility.

your maximum / minimum solution will be at the intersection of the lines that bound this region of feasibility.

the intersection points are:
(0,0)
(0,440)
(270,260)
(400,0)

your profit equation is:
profit = 3.5x + 4.0y
profit is calculated at each intersection point as follows:

```
intersection point         profit
(0,0)                     3.5*0 + 4.0*0 = 0
(0,440)                   3.5*0 + 4.0*440 = 1750
(270,260)                 3.5*270 + 4.0*260 = 1985 *****
(400,0)                   3.5*400 + 4.0*0 = 1400
```

your maximum profit is when you sell 270 pounds of yusip blend and 260 pounds of exotic blend.

Shannon's Chocolates produces semisweet chocolate chips and milk chocolate chips at its plants in Wichita, KS and Moore, OK. The Wichita plant produces 3000 pounds of semisweet chips and 2000 pounds of milk chocolate chips each day at a cost of $1000, while the Moore plant produces 1000 pounds of semisweet chips and 6000 pounds of milk chocolate chips each day at a cost of $1500. Shannon has an order from Food Box Supermarkets for at least 30,000 pounds of semisweet chips and 60,000 pounds of milk chocolate chips. How should Shannon schedule its production so that it can fill the order at minimum cost? What is the minimum cost?

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let x = number of days of production at wichita plant.

let y = number of days of production at moore plant.

your cost equation is:

cost = 1000x + 1500y

make a table as follows:

	semisweet	milk
wichita	3000	2000
moore	1000	6000

your constraint equations are:

x >= 0

y >= 0

3000x + 1000y >= 30,000

2000x + 6000y >= 60,000

to graph these equations, solve for y in those equations where y is present and then graph the equality portion of those equations.

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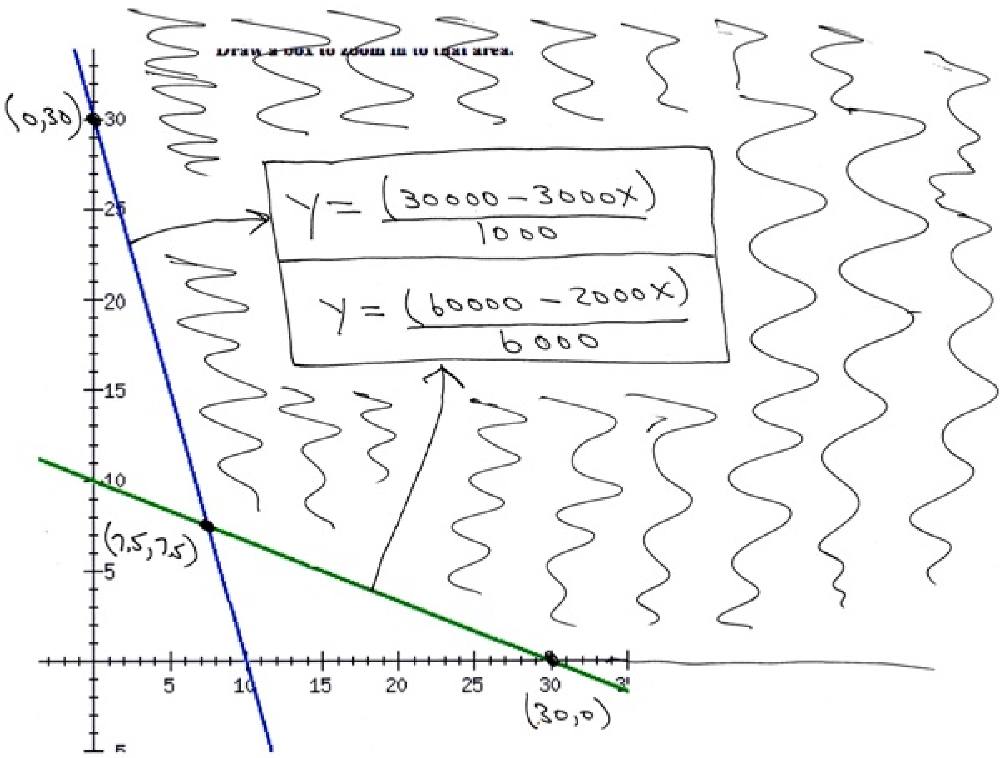
y = (30,000 - 3000x) / 1000
y = (60,000 - 2000x) / 6000

x = 0 is a vertical line that is the same line as the y-axis.
y = 0 is a vertical line that is the same line as the x-axis.



your cost equation is:

cost = 1000x + 1500y

cost is calculated at each intersection point as follows:

intersection point	cost
(0,30)	45,000
(30,0)	30,000
(7.5,7.5)	18,750 *****

your minimum cost is 18,750.

this occurs when wichita plant takes 7.5 days and moore plant takes 7.5 days.

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