

Linear Programming Word Problems

1. Jeanne makes banana bread and raisin bread to sell at a carnival. A loaf of banana bread requires 2 cups of flour and 2 eggs. A loaf of raisin bread takes 3 cups of flour and 1 egg. Jeanne has 12 cups of flour and 8 eggs on hand. She makes \$2 profit per loaf of banana bread and \$2 per loaf of raisin bread. To maximize profits, how many loaves of each type should she bake?

3 banana
2 raisin

	x	y	Constraint
	banana	raisin	
flour	2	3	12
eggs	2	1	8

$$P = 2b + 2r$$

$$2x + 3y \leq 12$$

$$2x + 1y \leq 8$$

$$(0, 4) = 2(0) + 2(4) = 8$$

$$(4, 0) = 2(4) + 2(0) = 8$$

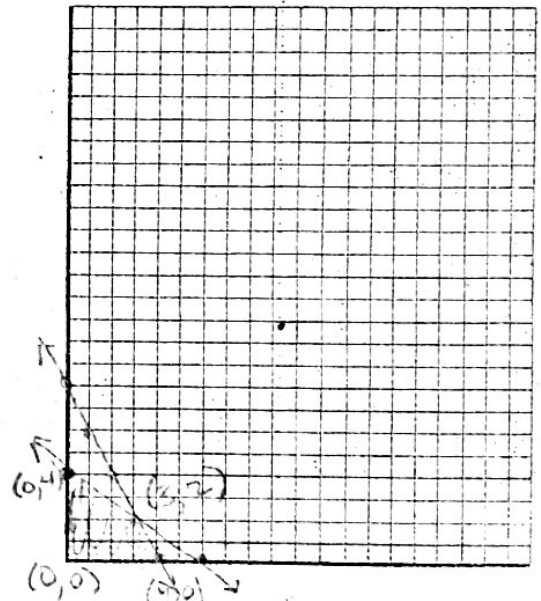
$$(3, 2) = 2(3) + 2(2) = 10$$

$$3y \leq -2x + 12$$

$$y \leq -\frac{2}{3}x + 4$$

$$y \leq -2x + 8$$

$$(0, 0) = 2(0) + 2(0) = 0$$



2. Miss Evans makes two types of wood clocks to sell at local stores. It takes her two hours to assemble a pine clock, which requires 1 oz of varnish. It takes two hours to assemble an oak clock, which takes 4 oz of varnish. Miss Evans has 16 oz of varnish in stock, and she can work 20 hours. If she makes \$3 profit on each pine clock and \$4 profit on each oak clock, how many of each type should she make to maximize her profits?

	x	y	Constraint
	Pine	Oak	
hours	2	2	20
varnish	1	4	16

$$P = 3x + 4y$$

$$2x + 2y \leq 20$$

$$1x + 4y \leq 16$$

$$(0, 4) = 3(0) + 4(4) = 16$$

$$(0, 0) = 3(0) + 4(0) = 0$$

$$(10, 0) = 3(10) + 4(0) = 30$$

$$(8, 2) = 3(8) + 4(2) = 32$$

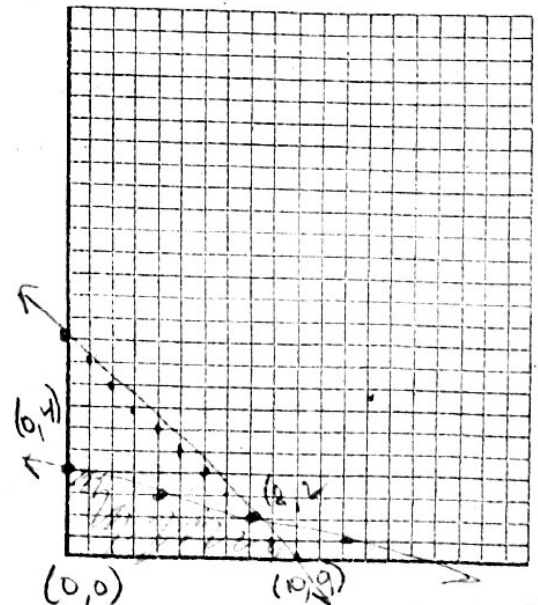
$$24 + 8$$

$$2y \leq -2x + 20$$

$$y \leq -x + 10$$

$$4y \leq -x + 16$$

$$y \leq -\frac{1}{4}x + 4$$



8 pine
2 oak

3. The Southern Bagel Factory makes two types of bagels, plain and blueberry. The oven can cook up to 200 bagels per hour. Blueberry bagels each require 2 ounces of dry ingredients and plain bagels each require 1 ounce of dry ingredients. The staff can prepare at most 300 ounces of dry ingredients. The profit on plain bagels is \$0.25 and the profit on blueberry bagels is \$0.36. How many of each type of bagel should be made per hour to maximize profit? What is the maximum hourly profit?

	plain (x)	blueberry (y)	Constraint
dry ing	1	2	300
oven (time)	1	1	200

$$P = .25x + .36y$$

$$x + 2y \leq 300$$

$$2y \leq -x + 300$$

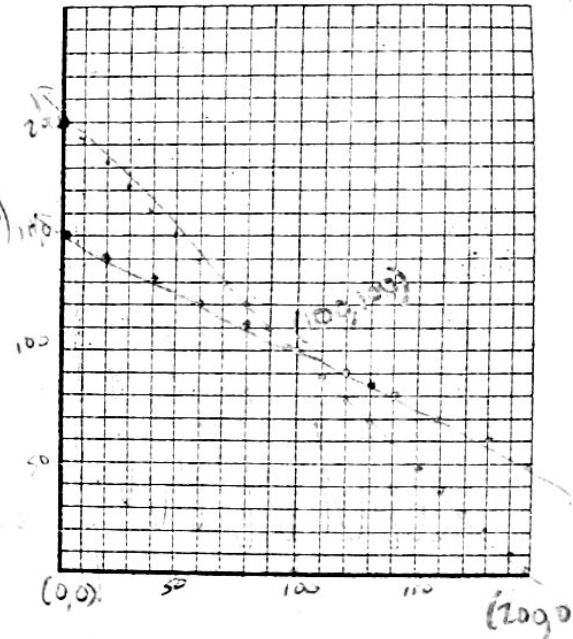
$$y \leq -\frac{1}{2}x + 150$$

$$x + y \leq 200$$

$$\begin{aligned} (0,0) & \quad .25(0) + .36(0) = 0 \\ (0,150) & \quad .25(0) + .36(150) = 54 \\ (100,100) & \quad .25(100) + .36(100) = 61 \\ (200,0) & \quad .25(200) + .36(0) = 50 \end{aligned}$$

$$y \leq -x + 200$$

Max (100, 100)
100 blueberry
100 plain



4. The area of parking lot is 600 square meters. A car requires 6 square meters. A bus requires 30 square meters. The attendant can handle only 60 vehicles. If a car is charged \$2.50 and a bus \$7.50, how many of each should be accepted to maximize income?

	car (x)	bus (y)	
area	6	30	600
attendant	x	y	60

$$x + y \leq 60$$

$$y \leq -x + 60$$

$$6x + 30y \leq 600$$

$$\frac{30y}{30} \leq \frac{-6x}{30} + \frac{600}{30}$$

$$y \leq -\frac{1}{5}x + 20$$

$$P = 2.50x + 7.50y$$

$$(0,0) = 2.50(0) + 7.50(0) = 0$$

$$(60,0) = 2.50(60) + 7.50(0) = 150$$

$$(50,10) = 2.50(50) + 7.50(10) = 200$$

$$(0,20) = 2.50(0) + 7.50(20) = 150$$

Max (50, 10)
50 cars
10 bus

