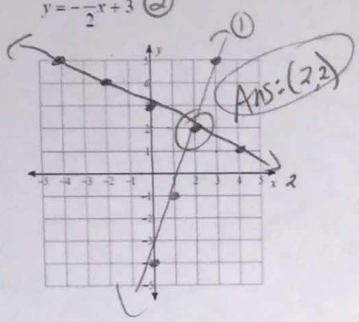
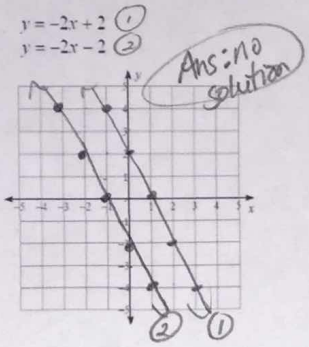
Solve by graphing

a. $y = 3x - 4$ ①
$y = -\frac{1}{2}x + 3$ ②



b. $y = -2x + 2$ ①
$y = -2x - 2$ ②



Solve by substitution

a. $x + 3y = 1$
$-3x - 3y = -15$

$x = -3y + 1$
$-3(-3y+1) - 3y = -15$
$9y - 3 - 3y = -15$
$6y = -12$
$y = -2$
$x + 3(-2) = 1$
$x = 7$
Ans: (7, -2)

b. $-3x - 8y = 20$
$-5x + y = 19$

$y = 5x + 19$
$-3x - 8(5x+19) = 20$
$-3x - 40x - 152 = 20$
$-43x = 172$
$x = -4$
$-5(-4) + y = 19$
$20 + y = 19$
$y = -1$
Ans: (-4, -1)

Solve by elimination

a. $5x + y = 9$ ·(-2)
$10x - 7y = -18$

$-10x - 2y = -18$
$+\ 10x - 7y = -18$
$-9y = -36$
$y = 4$
$5x + (4) = 9$
$5x = 5$ $x = 1$
Ans: (1, 4)

b. $-4x + 9y = 9$

$3(x - 3y = -6)$
$+\ 3x - 9y = -18$
$-1x = -9$
$x = 9$
$(9) - 3y = -6$
$-3y = -15$
$y = 5$
Ans: (9, 5)

Is (-3, 5) a solution to the system $\begin{cases} y = 2x + 11 \\ y - x = -2 \end{cases}$?

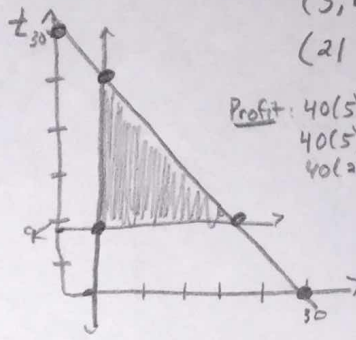
$5 = 2(-3) + 11$? yes
$5 - (-3) = -2$? no
Ans: No

http://www.mathportal.org/calculators/system-of-equations-solver/system-2x2.php

9. Fly-High Airlines sells business class and tourist class seats for its charter flights. To charter a plane at least 5 business class tickets must be sold and at least 9 tourist class tickets must be sold. The plane does not hold more than 30 passengers. Fly-High makes $40 profit for each business class ticket sold and $45 profit for each tourist class ticket sold. In order for Fly-High Airlines to maximize its profits, how many tourist class seats should they sell?

b = business
t = tourist
$b \geq 5$
$t \geq 9$
$b + t \leq 30$
$P = 40b + 45t$

Points: (5, 9)
(5, 25)
(21, 9)



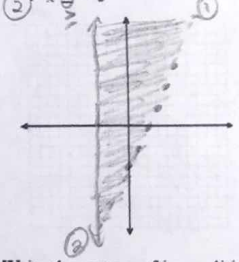
Profit: $40(5) + 45(9) = 605$
$40(5) + 45(25) = 1325$
$40(21) + 45(9) = 1245$
Max = $1325
# tourist tickets = 25

http://www.purplemath.com/modules/linprog3.htm

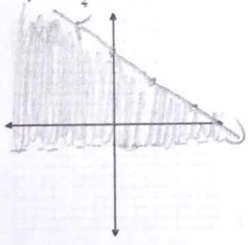
3) Graph the system of inequalities or equations, ~~then give an~~

Change

a) ① $2x - y < 4$ $y > 2x - 4$
② $x \geq -3$

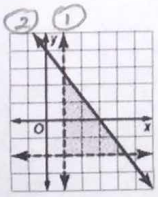


b) ① $y > -2$
② $y \leq -\frac{3}{4}x + 7$

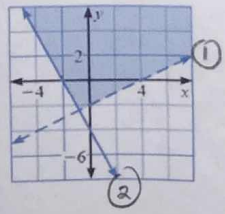


Write the system of inequalities that best represents this graph?

① $x > 1$
$y \leq -\frac{4}{3}x + 4$



10) Write the inequality for the graph:

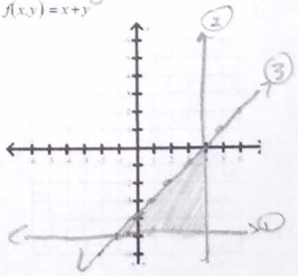


① $y > \frac{1}{2}x - 1$
② $y \geq -2x - 2$

http://www.regentsprep.org/regents/math/algebra/ae9/grineq.htm

Given below are some inequalities. Plot feasible region graphically.

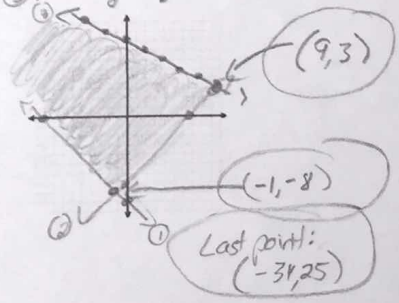
① $y \geq -5$
② $x \leq 4$
③ $y \leq x - 4$
④ $f(x,y) = x + y$ ← obj. function



★ Off graph

Find the coordinates of the vertices of the figure formed by each system of inequalities.

① $y + x \geq -9$ $y \geq -x - 9$
② $y \geq x - 7$
③ $2y + x \leq 16$ $y \leq -\frac{1}{2}x + 8$



6) A rectangular frame is to be designed in such a way that the sum of three times the length and four times the width is less than or equal to 80 inches and the length of the frame is a maximum of 15 inches. Write a system of inequalities to represent the dimensions of the frame.
Use *l* for length and *w* for width

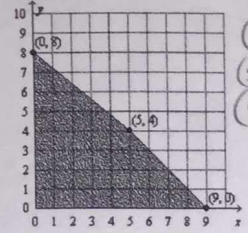
L = length w = width

$3L + 4w \leq 80$
$L \leq 15$
$w \geq 0$
$L \geq 0$

Inequality #1: _____
Inequality #2: _____
Inequality #3: _____
Inequality #4: _____

https://www.youtube.com/watch?v=Egu5DPSBxdk

2. Find the values of x and y that maximize the objective function $P = 3x + 2y$ for the graph. What is the maximum value?



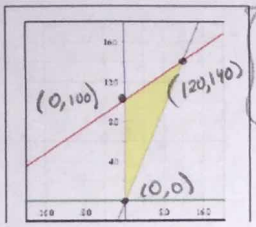
(0,8) $P=3(0)+2(8)=16$

(5,4) $P=3(5)+2(4)=23$

(9,0) $P=3(9)+2(0)=27$

Max = 27 @ (9,0)

Given the objective function and the graphed feasible region, determine the maximum and minimum values.



Objective function: $T = -2x + y$

What are the vertices of the feasible region?

(0,100) (0,0) (120,140)

Maximum Value: 140

Minimum Value: 0

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

(0,100) $T=-2(0)+100=100$

(120,140) $T=-2(120)+140=140$

10. The VBC Company makes two models of office chairs. The company's profit is $15 on each Model Q chair and $20 on each model R chair. To use linear programming to maximize profit, the company's finance officer developed this feasible region from the constraints on the company's resources and the pattern of demand for its products. The number of Model Q chairs to be made each week is represented by x and y represents the number of Model R chairs to be made each week. How many of each model should the company make each week in order to maximize profit?

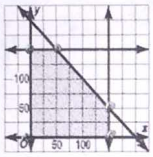
(0,0) $P=0$

(0,150) $P=20(150)=3000$

(50,150) $P=15(50)+20(150)=3750$

(150,0) $P=15(150)=2250$

(150,50) $P=15(150)+20(50)=3250$



$P=15Q+20R$

make 50 Q and 150 R for max of $3750

750 + 3000

2250 + 1000

https://www.youtube.com/watch?v=5iDAYII2IIw

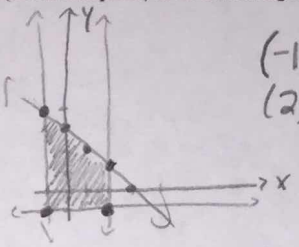
17. What are the vertices (intersection points) of the feasible region for the constraints:

$x \le 2$

$y \ge -1$

$x \ge -1$

$y \le -x + 3$



(-1,4) (-1,-1)

(2,-1) (2,1)

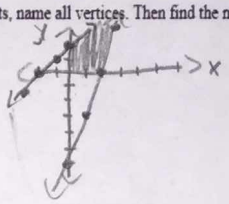
3. Given the system of constraints, name all vertices. Then find the maximum value of the given objective function.

$x \ge 0$

$y \ge 0$

$6x - 2y \le 12$ $y \ge 3x-6$

$4y \le 4x + 8$ $y \le x+2$



(0,0)

(0,2)

(2,0)

(4,6)

Maximum for $C = 4x - 3y$

$4(0)-3(0)=0$

$4(0)-3(2)=-6$

$4(2)-3(0)=8$

$4(4)-3(6)=-2$

Max = 8 @ (2,0)

18. On a feasible region whose vertices are (2,10), (3,7), (5,6) (6,4), what is the minimum of the objecti function R=6x-4y, and where does it occur?

$6(2)-4(10)=-28$

$6(3)-4(7)=-10$

$6(5)-4(6)=6$

$6(6)-4(4)=20$

min = -28 @ (2,10)

https://www.youtube.com/watch?v=7AnbEZvOFiU

9) Ace Guitars produces acoustic and electric guitars. Each acoustic guitar yields a profit of $30, and requires 2 work hours in factory A and 4 work hours in factory B. Each electric guitar yields a profit of $50 and requires 4 work hours in factory A and 3 work hours in factory B. Each factory operates for at most 10 hours each day. Graph the feasible region. Then, find the number of each type of guitar that should be produced each day to maximize the company's profits.

$P = 30a + 50e$

a = acoustic

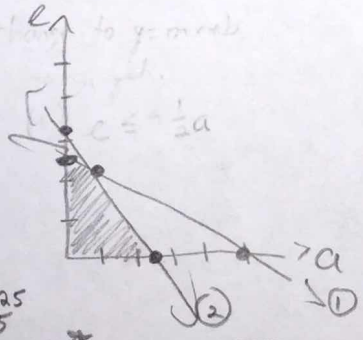
e = electric

① $2a + 4e \le 10$

② $4a + 3e \le 10$

$a \ge 0$

$e \ge 0$



Points:

(0,0) $P=0$

(0,2.5) $P=50(2.5)=125$

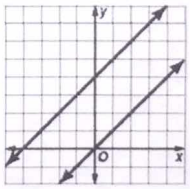
(2.5,0) $P=30(2.5)=75$

(1,2) $P=30(1)+50(2)=130$ ★

Max = 1 acoustic, 2 electric

https://www.youtube.com/watch?v=Z_aDBs9LWRY

14. What is the solution of the system shown in this graph?



no solution

How would you CLASSIFY this system $\begin{cases} 12x + 3y = -9 & ① \\ -y - 4x = 3 & ② \end{cases}$

Graph first! Or, you can put both into $y = mx + b$ and compare.

① $y = -4x - 3$ ← same line.

② $y = -4x - 3$

dependent, consistent

http://www.sparknotes.com/math/algebra1/systemsofequations/section1/page/2/