Warm Up

Ace Guitars produces acoustic and electric guitars. Each acoustic guitar (x) yields a profit of $30, and requires 2 work hours in factory A and 4 work hours in factory B. Each electric guitar (y) 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.

$$\begin{cases} 2x + 4y \le 10 \\ 4x + 3y \le 10 \\ x \ge 0 \\ y \ge 0 \end{cases}$$

8. Let x be the number of cleanings, and y be the number of cavities filled.

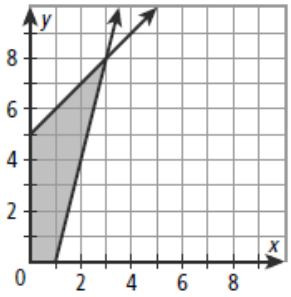
$$\begin{cases} x \ge 0 \\ 0 \le y \le 4 \\ 0.5x + y \le 7 \end{cases}$$

Maximize the objective function $P = 40x + 95y$.

x	y	$P = 40x + 95y$
0	0	$40(0) + 95(0) = 0$
0	4	$40(0) + 95(4) = 380$
6	4	$40(6) + 95(4) = 620$
14	0	$40(14) + 95(0) = 560$

Dr. Lee should book 6 cleanings and 4 fillings to maximize his earnings.

9.



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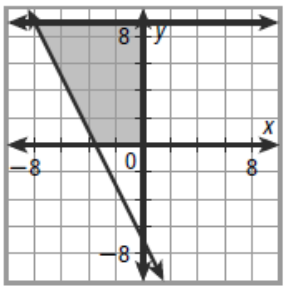

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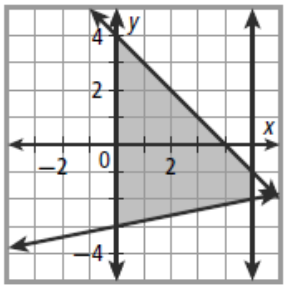


12. Find the vertices of the feasible region.
Maximize the objective function $P = -21x + 11y$.

x	y	$P = -21x + 11y$
0	0	$-21(0) + 11(0) = 0$
1	0	$-21(1) + 11(0) = -21$
0	5	$-21(0) + 11(5) = 55$
3	8	$-21(3) + 11(8) = 25$

$P = 55$ is the maximum.

13. Find the vertices of the feasible region.
Minimize the objective function $P = -2x - 4y$.

x	y	$P = -2x - 4y$
−7	0	$-2(-7) - 4(0) = 14$
0	9	$-2(0) - 4(9) = -36$
−8	9	$-2(-8) - 4(9) = -20$
−3.5	0	$-2(-3.5) - 4(0) = 7$

$P = -36$ is the minimum.

14. Find the vertices of the feasible region.
Maximize the objective function $P = x + 3y$.

x	y	$P = x + 3y$
0	−3	$(0) + 3(-3) = -9$
0	4	$(0) + 3(4) = 12$
5	−1	$(5) + 3(-1) = 2$
5	−2	$(5) + 3(-2) = -1$

$P = 12$ is the maximum.

23. Let x be the number of Soy Joy smoothies, and y be the number of Vitamin Boost smoothies.

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ 2x + y \leq 100 \\ x + 3y \leq 100 \end{cases}$$

Maximize the objective function $P = 2.75x + 3.25y$.

x	y	$P = 2.75x + 3.25y$
0	0	$2.75(0) + 3.25(0) = 0$
0	33	$2.75(0) + 3.25(33) = 107.25$
50	0	$2.75(50) + 3.25(0) = 137.5$
40	20	$2.75(40) + 3.25(20) = 175$

The store should make 40 Soy Joy and 20 Vitamin Boost smoothies.

27. D

28. A;
$P(0,0) = -4(0) + (0) - 1 = -1$

29. G

3-1: Solving systems using graphing

What we learned? Graphing is not very accurate. Instead the big thing was the vocabulary!

Consistent Systems: have at least 1 solution
Inconsistent Systems: have no solutions

Independent: Have different slopes
Dependent: Have the same slope

Classify the following systems:

$$\begin{cases} x = 2y + 6 \\ 3x - 6y = 18 \end{cases}$$

$2y = x - 6$

$y = \frac{1}{2}x - 3$

$-6y = -3x + 18$

$y = \frac{1}{2}x - 3$

Consistent, dependent

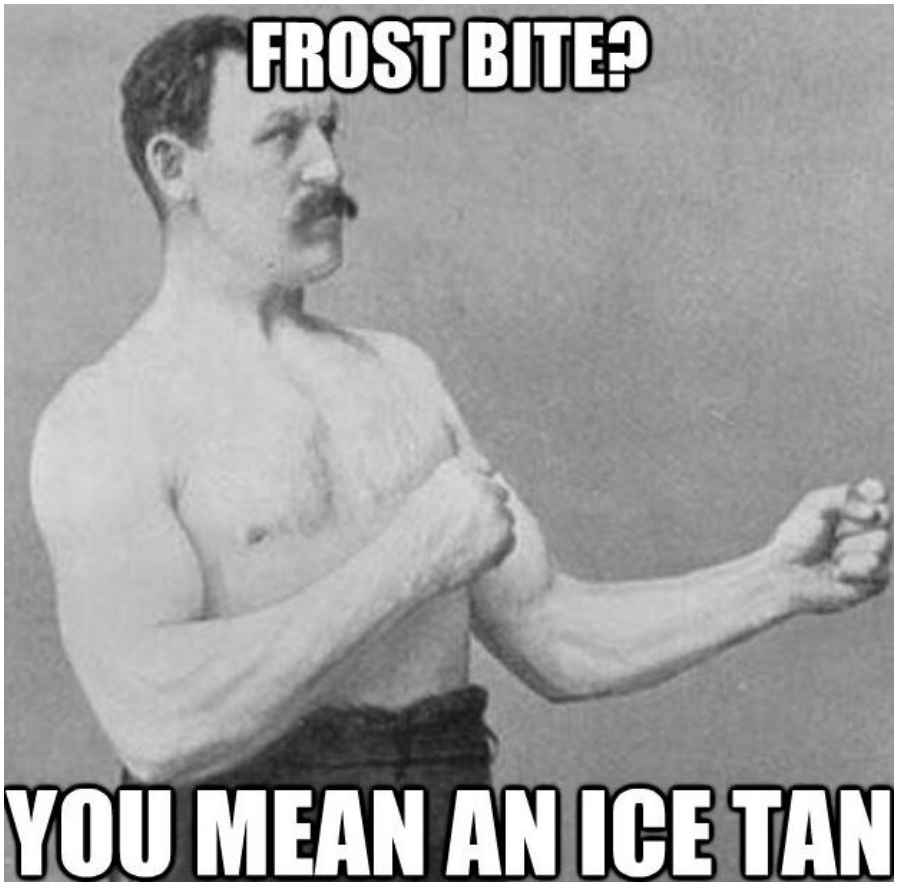
infinite soln

$$\begin{cases} x + 4 = y \\ 5y = 5x + 35 \end{cases}$$

$y = x + 7$

inconsistent

0 soln



3-2: Substitution and Elimination

To use substitution: solve for a variable and plug that into the other equation. Solve for variable and then use to find second variable.

To use elimination: eliminate a variable by adding equations together. Solve for variable and then use to find second variable.

Use substitution to solve:

$$\begin{cases} 2y + x = 4 \\ 3x - 4y = 7 \end{cases}$$

$x = 4 - 2y$

$3(4-2y) - 4y = 7$

$12 - 6y - 4y = 7$

$-10y = -5$

$y = \frac{1}{2}$

$x = 4 - 2(\frac{1}{2})$

$x = 3$

$(3, \frac{1}{2})$

$$\begin{cases} 5x + 6y = -9 \\ 2x - 2 = -y \end{cases}$$

$y = 2 - 2x$

$5x + 6(2-2x) = -9$

Use elimination to solve:

$$\begin{cases} 3x + 2y = 4 \\ 4x - 2y = -18 \end{cases}$$

$7x = -14$

$x = -2$

$3(-2) + 2y = 4$

$-6 + 2y = 4$

$2y = 10$

$y = 5$

$(-2, 5)$

$5(5x - 3y = 42)$

$3(8x + 5y = 28)$

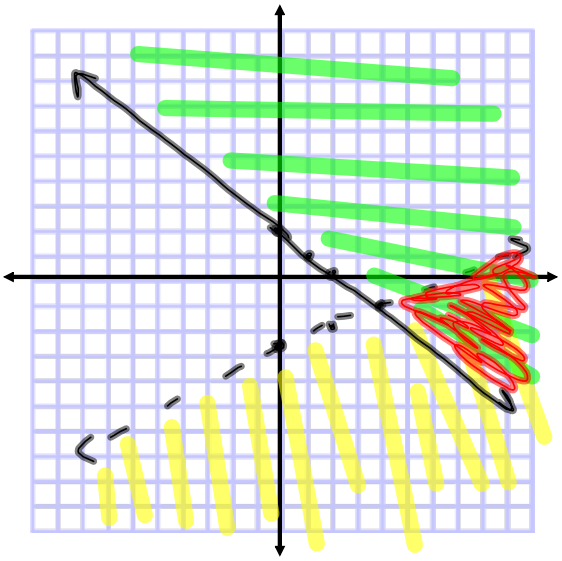
$25x - 15y = 210$

$24x + 15y = 84$

3-3: Linear system of inequalities

Graph each linear inequality and shade the solution area.

$$\begin{cases} y < \frac{1}{2}x - 3 \\ y \geq -x + 2 \end{cases}$$

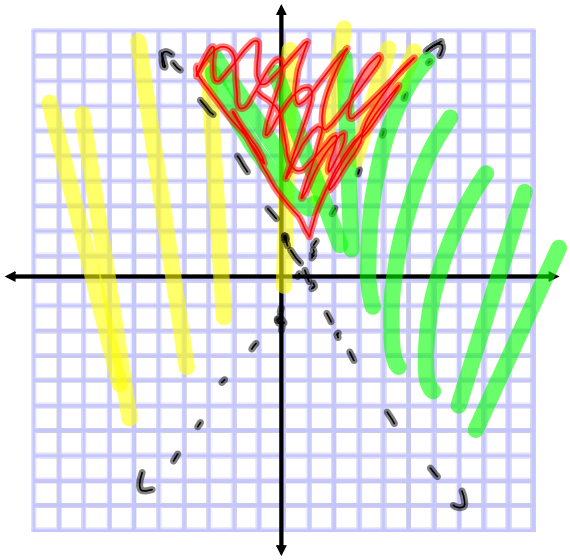


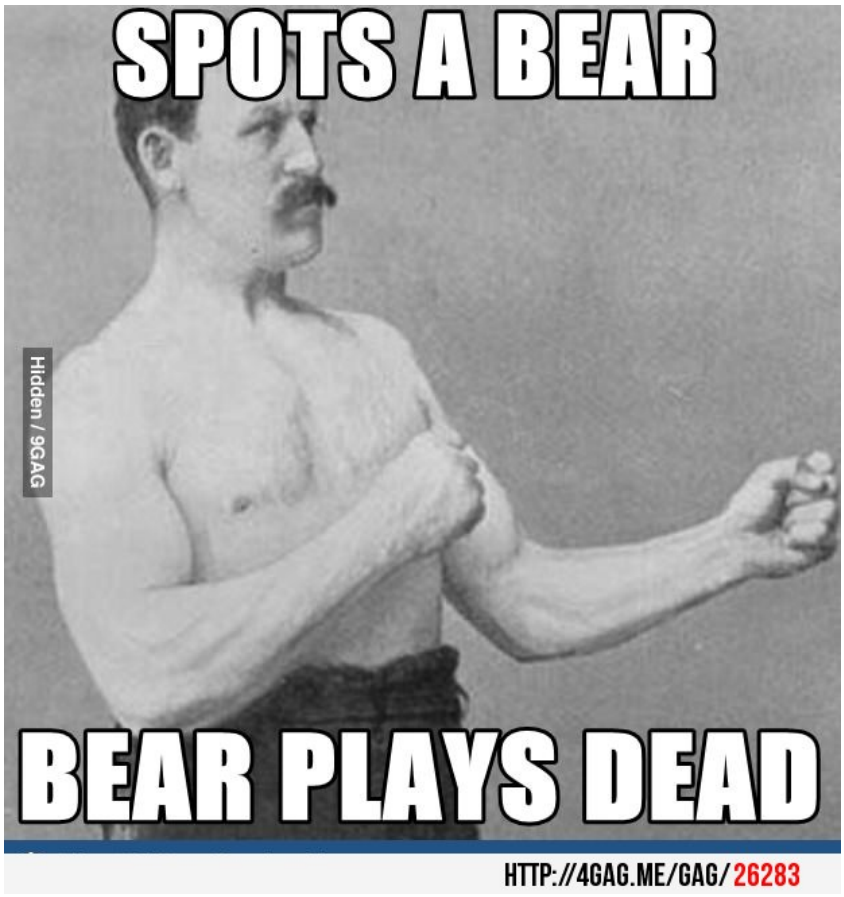
$$\begin{cases} x - 3y < 6 \\ 2x + y > 1.5 \end{cases}$$

$-3y < -x + 6$

$y > \frac{1}{3}x - 2$

$y > -2x + 1.5$





3-4: Linear Programming

You need to first write out your inequalities. Break the problem down, what is it asking?

Graph the inequalities and find the vertices of your solution area. Use the calculator to find the points.

Use the vertices to find the maximum/minimum of the problem.

Anything you would like to try/any other questions you have before the quiz?