# Unit 3 Practice SWIG – Linear Systems and Linear Programming

Name: Key　　　　　　　　　　Period:__________

***3. A. Translate a verbal model into an algebraic model.***

**1.** Art Club wants to raise $1000 for new art supplies. They are having a fundraising banquet to raise the money. They sell tickets for $6 per child (c) and $8 per adult (a) and they sell a total of 150 tickets. **Set up** a system of equations that represents this model algebraically that could be used to solve how many of each ticket were sold. **DO NOT SOLVE**.

Let c be the # of child tickets

Let a be the # of adult tickets

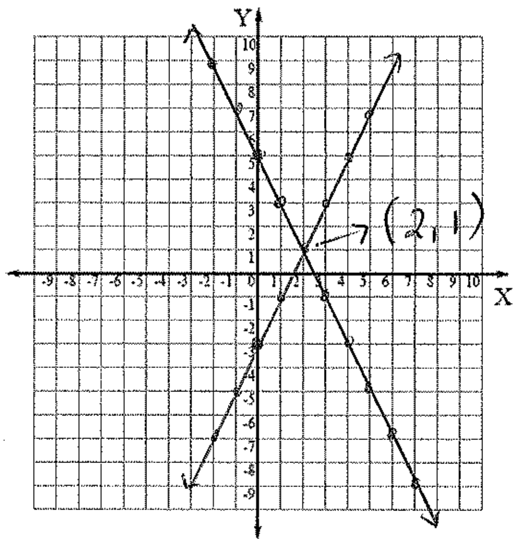
$$\boxed{\begin{aligned} c + a &= 150 \\ 6c + 8a &= 1000 \end{aligned}}$$

***3. B. Solve a system of equations graphically, algebraically and using matrices.***

**Solve the following problems by graphing.**

**2.** $y = -2x + 5$　Slope: $-\frac{2}{1}$　y-int: 5

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




**They intersect at (2, 1)**

**3.** $x + y = 4$

$2y = x - 4$

Solve for y first: $x + y = 4$

$-x \quad -x$

$y = -1x + 4$

Slope: $-\frac{1}{1}$

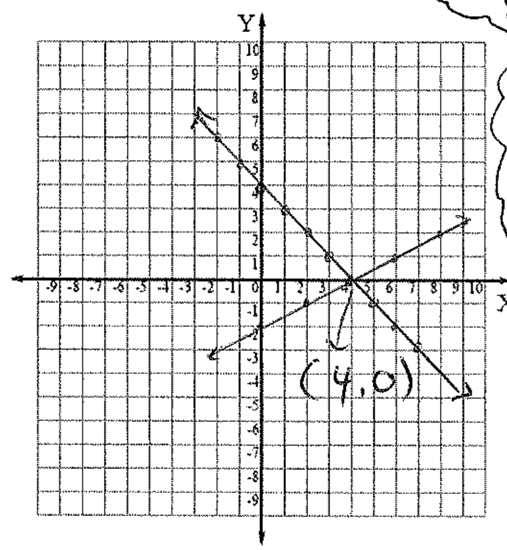
y-int: 4

$\frac{2y}{2} = \frac{1x}{2} - \frac{4}{2}$

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

Slope: $\frac{1}{2}$

y-int: $-2$




**They intersect at (4, 0)**

**Solve the following problems using the method of your choice.**

**4.** $8x + 4y = 12$

$y = 3 - 2x$

I choose substitution!　**4.**________________

$8x + 4(3 - 2x) = 12$

$8x + 12 - 8x = 12$

$\quad -12 \qquad\quad -12$

$8x - 8x = 0$

$0 = 0$

True statement.

So $\infty$ many solutions.

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I choose elimination for 5 and 6.

**5.** $9(5x - 2y = 4) \rightarrow 45x - 18y = 36$

$2(11x + 9y = -18) \quad 22x + 18y = -36$

$\frac{67x}{67} = \frac{0}{67}$

$x = 0$

$5x - 2y = 4$

$5(0) - 2y = 4$

$\frac{-2y}{-2} = \frac{4}{-2} \quad y = -2$

x y

**5.** $(0, -2)$

**6.** $4x - y = 20$

$x + y = -5$

$\frac{5x}{5} = \frac{15}{5}$

$x = 3$

$x + y = -5$

$3 + y = -5$

$-3 \quad -3$

$y = -8$

**6.** $(3, -8)$

***3. C. Understand the relationship between a system of equations and its number of solutions***

**7.** **How many solutions does the following system have?** $y = -2x + 6$, $y = -2x - 5$

Slopes equal $\Rightarrow$ $\parallel$ lines $\therefore$ No sol.

a) infinitely many solutions

b) no solution

c) 1 solution

d) 2 solutions

***3. D. Graph of system of inequalities to determine the feasible region and maximize or minimize an objective function.***

**Solve each system of inequalities by graphing.**

**8.** $4x - 3y > 9$

$2x + y \le 5$

Solve each for y first.

$4x - 3y > 9$

$-4x \quad -4x$

$\frac{-3y}{-3} > \frac{-4x + 9}{-3}$

flip $y < \frac{4}{3}x - 3$

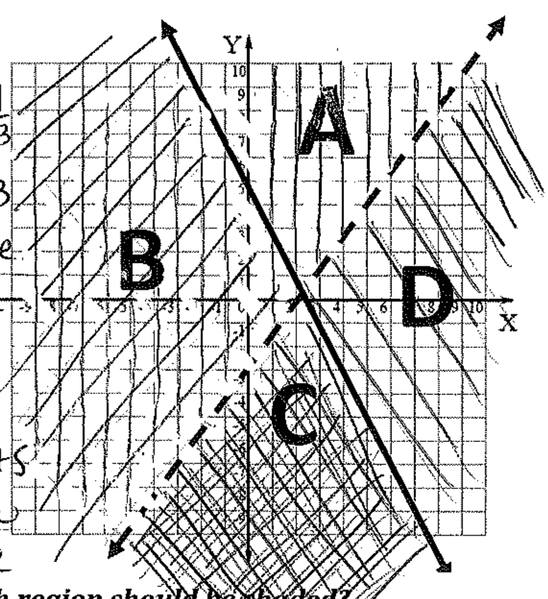
Shade above dashed line

$2x + y \le 5$

$-2x \quad -2x$

$y \le -2x + 5$

Shade below solid line

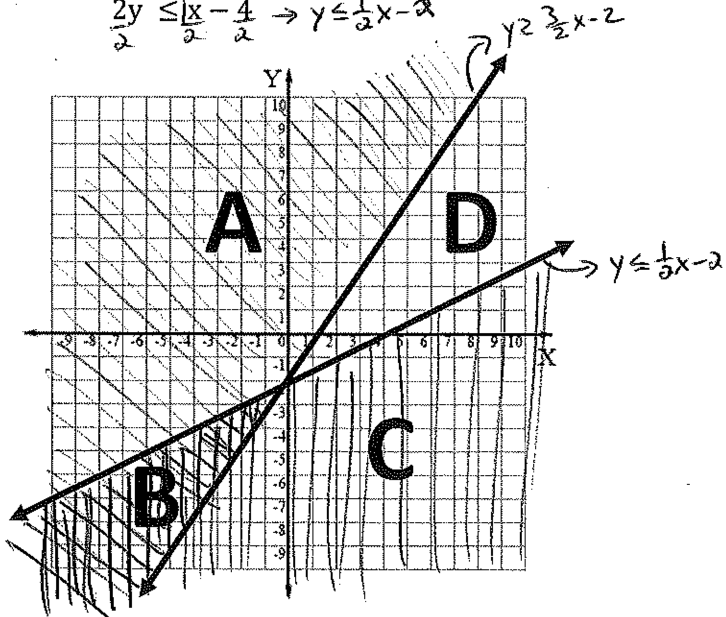



***Which region should be shaded?***

a) A b) B c) C d) D

**9.** $y \ge \frac{3}{2}x - 2 \rightarrow$ Shade above

$\frac{2y}{2} \le \frac{1x}{2} - \frac{4}{2} \rightarrow y \le \frac{1}{2}x - 2$




***Which region should be shaded?***

a) A b) B c) C d) D

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All solid lines

**10. Find the coordinates of the vertices of the feasible region.**

① $x \geq -4$ → vertical, shade above (right)

② $x + y \leq 5$

③ $y \geq 2x - 1$

slope: $\frac{2\uparrow}{1\rightarrow}$ shade above

y-int: $-1$

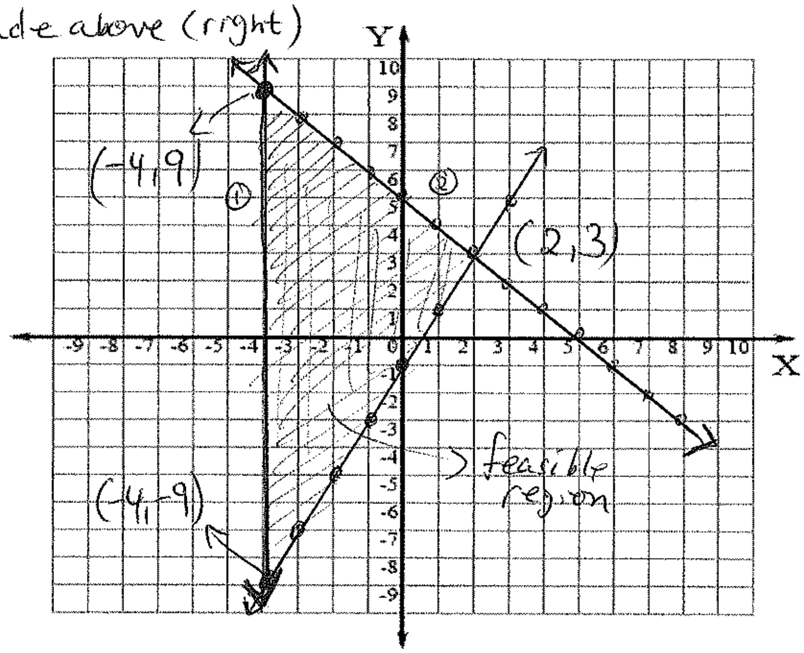
②
$x + y \leq 5$
$-x \quad -x$

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

slope: $\frac{-1\downarrow}{1\rightarrow}$

y-int: 5

shade below




**Vertices:**

(-4, 9),

(-4, -9),

(2, 3)

**11. Using the vertices (0, 9), (7, 0), and (0, 0) find the maximum and minimum values of the function C = 4x – y.**

$C = 4(0) - (9) = 0 - 9 = -9$

$C = 4(7) - (0) = 28 - 0 = 28$

$C = 4(0) - (0) = 0 - 0 = 0$

**Maximum=** 28

**Minimum=** -9

***3. E. Problem solve using Linear Programming.***

**For #12 set up the problem using the given information. <u>DO NOT SOLVE.</u>**

**12.** Lily is taking a test and wants to maximize her point total. The test consists of multiple choice questions (m) worth 5 points each and short answer questions (s) worth 10 points each. It takes her 4 minutes to answer each multiple choice question and 8 minutes for each short answer question. The total time allowed is 50 minutes and no more than 20 questions can be answered.

Given C(m,s) = 5m + 10s, what are the constraints to find the maximum point total?

Constraints:

$4m + 8s \leq 50$

$m + s \leq 20$

$m \geq 0$

$s \geq 0$