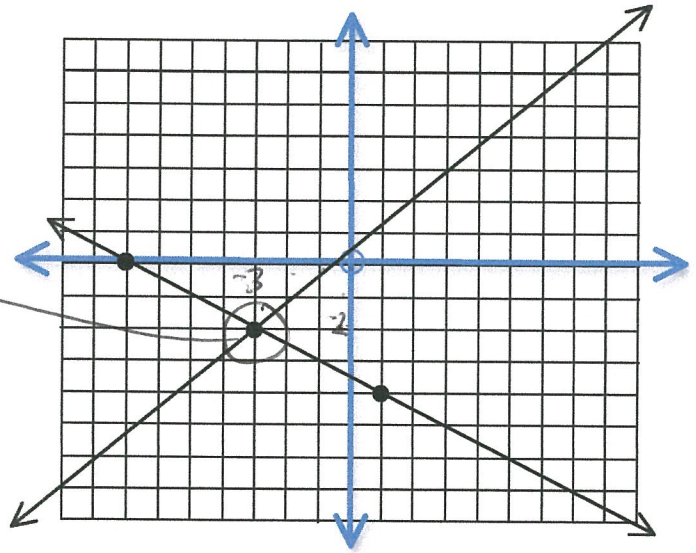


Instructions: You may use a calculator on this test so don't use one to practice. On the actual exam, all work must be shown in order to receive all points for all questions so practice showing all work. Practice **boxing your final answer**. Any answer that is a fraction must be in lowest terms and as mixed number for full credit. Since you can use a 5x8 notecard on the test use your notecard to practice or make one based on the problems you got wrong. Happy studying!

1. Find the solution to the system shown.
 Give the solution as an ordered pair.

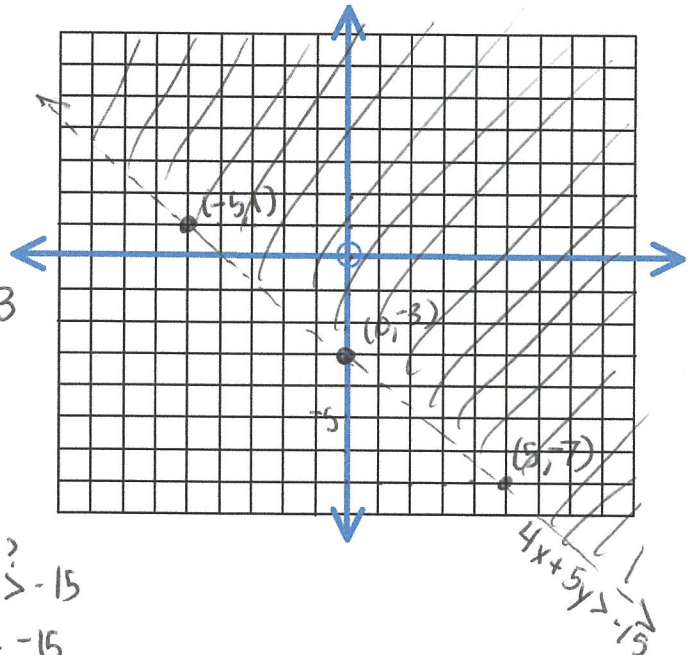
$(-3, -2)$



2. Solve the following **linear inequality** in 2 variables. Make sure to graph the boundary line using 3 labeled ordered pairs and show the work for a check point above and below the boundary line. Don't forget to label the solution.

$$4x + 5y > -15$$

$$\frac{5y}{5} > \frac{-4x - 15}{5} \Rightarrow y > \frac{-4}{5}x - 3$$



Above (0,0)

$$4(0) + 5(0) > -15$$

$$0 > -15$$

True
 ☉ shade

Below (0,-5)

$$4(0) + 5(-5) > -15$$

$$-25 > -15$$

False

Answer #3-5 as an ordered pair where appropriate. Choose a different system for each problem.

You need only solve one system for each question.

a) $2x + 10y = 3$
 $1 - 5y = x$

b) $3x - 2y = 3$
 $-\frac{4}{3}x + y = \frac{1}{3}$

c) $8x - 4y = -6$
 $8x = 4y - 6$
 $4x - 3y = 2$

3. $\rightarrow -x - 5y = -1$ Solve a system using elimination.

a) $2x + 10y = 3$
 $-2x - 10y = -2$

 $0 = 1$

\therefore **No Solution**

b) $9x - 6y = 9$
 $-8x + 6y = 2$

 $x = 11$

$3(11) + -2y = 3$
 $-33 - 2y = 3$
 $-2y = 36$
 $y = -18$

(11, -18)

c) $8x - 4y = -6$
 $-8x + 6y = -4$

 $2y = 10$
 $y = 5$

$8x = 4(5) - 6$
 $8x = 14$
 $x = \frac{14}{8} = \frac{7}{4}$

($\frac{7}{4}, 5$)

4. Solve a system using substitution.

a) $2(1 - 5y) + 10y = 3$
 $2 - 10y + 10y = 3$
 $2 = 3$

\therefore **No Solution**

b) $y = \frac{4}{3}x + \frac{1}{3}$
 $3x + -2(\frac{4}{3}x + \frac{1}{3}) = 3$
 $3(3x + -\frac{8}{3}x + -\frac{2}{3} = 3)$
 $9x - 8x - 2 = 9$
 $x - 2 = 9$
 $x = 11$

$-\frac{4}{3}(11) + y = \frac{1}{3}$
 $-\frac{44}{3} + y = \frac{1}{3}$
 $y = \frac{45}{3} = 15$

c) $x = \frac{4}{3}y - \frac{6}{8} = \frac{1}{2}y - \frac{3}{4}$
 $4(\frac{1}{2}y - \frac{3}{4}) - 3y = 2$

$2y - 3 - 3y = 2$
 $-y - 3 = 2$
 $-y = 5$
 $y = -5$

$4x - 3(-5) = 2$
 $4x + 15 = 2$
 $4x = -13$
 $x = -\frac{13}{4} = -3\frac{1}{4}$

5. Use the method of your choice to solve the last problem.

See 3a), b), c) or 4a), b) or c)

Checks:

a) No solution means the lines are parallel
 $\frac{10y}{10} = \frac{-2x + 3}{10} \Rightarrow y = -\frac{1}{5}x + \frac{3}{10}$
 $-\frac{5y}{5} = \frac{x - 1}{5} \Rightarrow y = -\frac{1}{5}x + \frac{1}{5}$
 Same slope, different y-int confirms solution.

b) $3(11) - 2(15) \stackrel{?}{=} 3$
 $33 - 30 \stackrel{?}{=} 3$
 $3 = 3 \checkmark$
 $-\frac{4}{3}(11) + 15 \stackrel{?}{=} \frac{1}{3}$
 $-\frac{44}{3} + \frac{45}{3} \stackrel{?}{=} \frac{1}{3}$
 $\frac{1}{3} = \frac{1}{3} \checkmark$

c) $\frac{2}{8}(-\frac{13}{4}) \stackrel{?}{=} 4(-5) - 6$
 $-\frac{13}{16} \stackrel{?}{=} -20 - 6$
 $-\frac{13}{16} \neq -26 \checkmark$
 $4(-\frac{13}{4}) - 3(-5) \stackrel{?}{=} 2$
 $-13 + 15 \stackrel{?}{=} 2$
 $2 = 2 \checkmark$

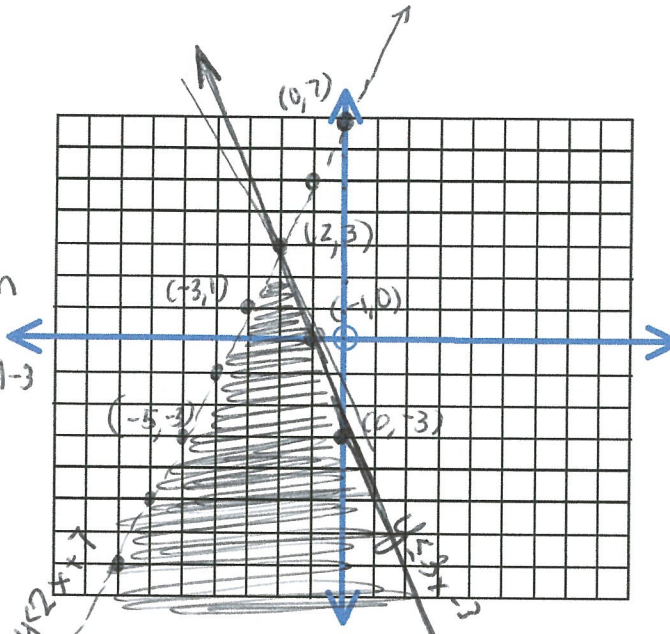
6. Solve the system:

$$\begin{aligned} y &< 2x + 7 \\ y &\leq -3x - 3 \end{aligned}$$



Confirm Solution
(-2, 0)

$$\begin{aligned} 0 &\stackrel{?}{<} 2(-2) + 7 & 0 &\stackrel{?}{\leq} -3(-2) - 3 \\ 0 &\stackrel{?}{<} -4 + 7 & 0 &\leq 6 - 3 \\ 0 &< 3 & 0 &\leq 3 \\ \text{True} & & \text{True} & \end{aligned}$$



7. If the width of my family room is decreased by one and then doubled, it is the same as the length. If the perimeter of my family room is 62 feet, find the length and the width. This must use algebra, show setup, an equation and give units to receive full credit. Show all setup, and a system of equations that will be used to solve the problem, but do not solve the system.

$$\begin{aligned} \text{length} &= 2(\text{width} - 1) = y \\ P &= 2l + 2w = 62 \text{ ft.} \\ \text{width} &= x \end{aligned}$$

$$\begin{aligned} y &= 2(x - 1) \\ 2y + 2x &= 62 \end{aligned}$$

$$\begin{aligned} 2(2x - 2) + 2x &= 62 \\ 4x - 4 + 2x &= 62 \\ 6x - 4 &= 62 \end{aligned}$$

$$\begin{aligned} 6x &= 66 \\ x &= 11 \end{aligned}$$

$$y = 2(11 - 1) = 20 \text{ ft.}$$

The length is 20 feet and the width is 11 feet.

8. Julie invested \$24,000 in two funds. The first, a bond, paid 5% simple annual interest and the 2nd, a money market, paid 3% simple annual interest. She earned a total of \$1120 in interest in one year. How much did she invest at each rate? Show setup, the system of equations and then solve the system, answering with a complete sentence that includes units.

	P	R	T	I
bond	x	5%	1	0.05x
money mkt	y	3%	1	0.03y
Invested	\$24,000	X	X	\$1120

Total Invested: $x + y = 24000$

Interest Earned: $0.05x + 0.03y = 1120$

$$\begin{aligned} 5x + 5y &= 120000 \\ -5x - 3y &= -112000 \\ \hline 2y &= 8000 \\ \frac{2y}{2} &= \frac{8000}{2} \\ y &= 4000 \end{aligned}$$

$$\begin{aligned} x + 4000 &= 24000 \\ -4000 &-4000 \\ \hline x &= 20000 \end{aligned}$$

The amount invested in the bond @ 5% is \$20,000 and the amount invested in the money market @ 3% is \$4,000.

9. A lab has a 20% acid solution and a 50% acid solution. How many liters of each are required to obtain 600 liters of a 30% acid solution? Show setup and a system of equations that could be used to solve but do not solve.

	V	%	Pure Acid
Weak	x	20%	0.2x
Strong	y	50%	0.5y
Mix	600L	30%	0.3(600) = 180.0L

$$\begin{cases} x + y = 600 & \leftarrow \text{Volume: Weak + Strong} = 600 \\ 0.2x + 0.5y = 180 & \leftarrow \text{Acid: Weak + Strong} = 180 \end{cases}$$

10. The Campus Coffee House wishes to make a Cajun Crazy coffee mixture from 2 of their most popular coffees, Creole Cahoots and Bayou Shenanigans. The Creole Cahoots sells for \$7 a pound and they wish figure out how much of it to add to 14 pounds of the Bayou Shenanigans which sells for \$4 a pound to make the Cajun Crazy mixture that will sell for \$5 a pound. Show setup and a system of equations that could be used to solve but do not solve.

	V	\$/lbs	Total \$
Bayou	14lbs	\$4/lbs	14(4) = \$56
Creole	x	\$7/lbs	7x
Mix Cajun	y	\$5/lbs	5y

Volume Equation

$$14 + x = y$$

Total Value Equation

$$56 + 7x = 5y$$

11. Tickets to a play were sold at \$4 for adults, and \$2.50 for students. If 270 tickets were sold for a total of \$825, how many adult tickets were sold? Show setup and a system of equations that could be used to solve but do not solve.

	#Tix	\$/tix	Total \$
Adult	x	\$4/tix	4x
Students	y	\$2.50/tix	5y
Total	270	X	\$825

Total # Equation

$$x + y = 270$$

Total Value Equation

$$4x + 5y = 825$$

12. For $7x - 5 - 9x^3 - 2x^2$
- a) Give the degree of each term.

$$\begin{matrix} 7x & , & -5 & , & -9x^3 & , & -2x^2 \\ 1^{\text{st}} & & \text{zero} & & 3^{\text{rd}} & & 2^{\text{nd}} \end{matrix}$$

- b) Give the degree of the polynomial.

Highest Degree which is 3^{rd} Degree

- c) Describe as a polynomial in one variable or a polynomial in two variables.

Polynomial in one variable

12. con'd

d) Describe as linear, quadratic or cubic.

Cubic

c) Order the polynomial

$-9x^3 - 2x^2 + 7x - 5$

13. Choose the one that is not a polynomial and explain why it is not a polynomial.

a) $-x^3y^3 + 7x^2y^2 - 3xy + 5$

b) $-5x^4y^2$

c) $2x^2 - x^{-1} + x - 5$

Exponents aren't integers \rightarrow

14. Simplify. Leave no negative exponents.

a) $(7x^2y^3)(2x^3y)$

= $14x^5y^4$

b) $(-5x^3y^3)^3$

= $-125x^9y^9$

c) $7x^{-1}$ Just the x in the denom.

$\frac{7}{x}$

d) $7x^0 - (6x^2)^0$

= $7 - 1 =$ 6

e) $\frac{3x^3y^{3-1}}{18x^5y}$

= $\frac{y^2}{6x^2}$

15. Expand completely.

a) $(x+3)(x-5)$ FOIL $x^2 - 5x + 3x - 15$

= $x^2 - 2x - 15$

b) $(2x+5)(5x-3)$ $-6x + 25x$

= $10x^2 + 19x - 15$

FOIL $10x^2 - 6x + 25x - 15$

d) $(2x+1)(2x-1)$ Conjugates! $= a^2 - b^2$

= $4x^2 - 1$

e) $(x+2)(x^2 - 2x + 4)$

$$\begin{array}{r} x^2 - 2x + 4 \\ x + 2 \\ \hline 2x^2 - 4x + 8 \\ x^3 - 2x^2 + 4x \\ \hline x^3 + 8 \end{array}$$

f) $(2x-3)^2 = 4x^2 - 12x + 9$

Middle $2(2x)(3)$
PST: $a^2 + 2ab + b^2$

g) $(2x-3)(y+5) =$ $2xy + 10x - 3y - 15$

16. Add or subtract. Simplify completely.

a) $(2x^3 - 7x^2 + 3x - 9) + (3 + 3x^2 - 7x^3 - x) = \boxed{-5x^3 - 4x^2 + 2x - 6}$

b) $(3x - 4x^2 + 9) - (7x - 9x^3 - 8x^2 + 16) = \begin{array}{r} 9x^3 + 8x^2 - 7x - 16 \\ -4x^2 + 3x + 9 \\ \hline 9x^3 + 4x^2 - 4x - 7 \end{array}$

17. Divide the following. Show all work. Remember to break it up into 3 separate terms & use monomial division.

$$\frac{3x^3y^2 - 4x^2y^2 + 9}{4xy^2} = \frac{3x^3y^2}{4xy^2} - \frac{4x^2y^2}{4xy^2} + \frac{9}{4xy^2}$$

$$= \boxed{\frac{3x^2}{4} - x + \frac{9}{4xy^2}}$$

18. If $f(x) = 2x^2 + 3x - 4$ & $g(x) = 2x + 7$ Find $(f+g)(-5)$

$$(f+g)(x) = (2x^2 + 3x - 4) + (2x + 7) = 2x^2 + 5x + 3$$

$$\begin{aligned} (f+g)(-5) &= 2(-5)^2 + 5(-5) + 3 \\ &= 2(25) + -25 + 3 = 25 + 3 = \boxed{28} \end{aligned}$$