Solving Systems: SPECIAL CASES
Problem Set 6D

Name ______________________________

Date ____________________ Period ________

1. FYI

SOLVING SYSTEMS – WEIRD THINGS CAN HAPPEN

PART I: So now you have learned to solve systems of equations by three methods, 1) visually by graphing and 2) algebraically by substitution and 3) algebraically by elimination. You're an expert, right? Not so fast Einstein. Let's check out some other results and see what's what.

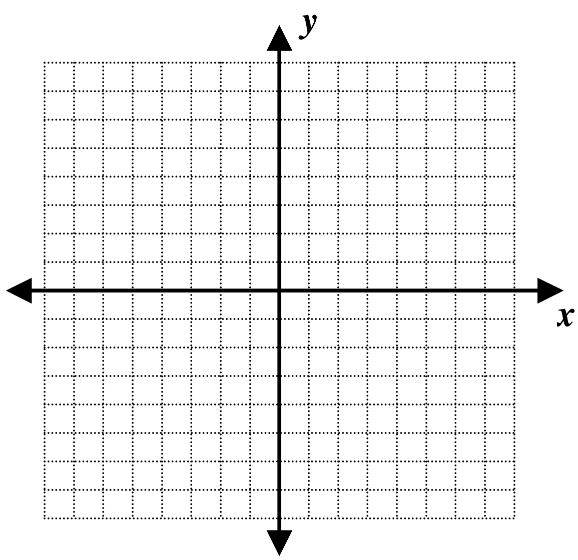
Solve the system:
$$\begin{aligned} 4x+2y&=10 \\ y&=-2x+5 \end{aligned}$$

Well, we have a clean "y=" form here, so let's try substitution on this one:

Substituting "$-2x+5$" for y, we get:

$$4x+2(-2x+5)=10$$
$$4x+(-4x)+10=10$$
combine like terms and the $4x$ and $-4x$ cancel, so...
$$10=10 \quad ???$$

Hmmm… 10 = 10, huh? 10 is **ALWAYS** equal to 10, no matter what x and y are! What is **THIS** supposed to mean?! Well, when in doubt, we should graph, right? So graph both of the equations on the same coordinate plane below. Maybe convert the first equation to slope-intercept form ("y=") as well. Explain your result.



2.

FYI

SOLVING SYSTEMS – WEIRD THINGS CAN HAPPEN

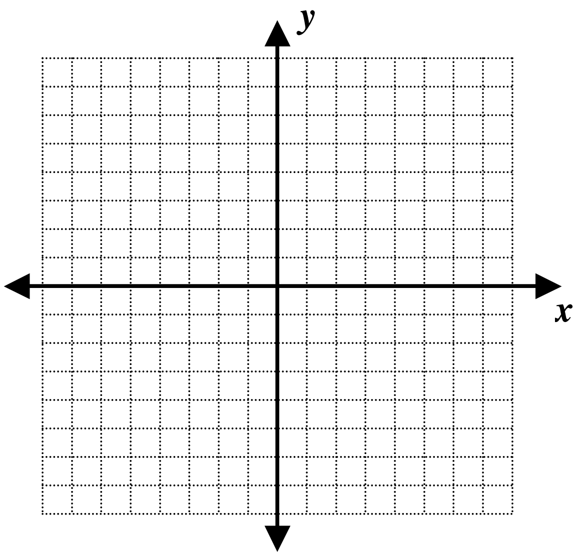
PART II: In the previous example, we saw that it is possible that two equations that appear to be different, can actually graph the same line. Let's check out another example:

Solve the system:
$$\begin{aligned} 2x - 3y &= -6 \\ -4x + 6y &= 24 \end{aligned}$$

OK, this system looks like a great candidate for the elimination method. Just multiply the top equation by 2, and we'll eliminate the *x* term, ipso facto!

$$\begin{aligned} 4x - 6y &= -12 \\ -4x + 6y &= 24 \\ \hline 0x + 0y &= 12 \\ 0 &= 12 \quad ?? \end{aligned}$$

Hmmm… not only did the *x* term add out to zero, the *y* term disappeared, too.
0 = 12, huh?
0 is **NEVER** equal to 12, no matter what *x* and *y* are! What is **THIS** supposed to mean?! Well, once again, when in doubt, we should graph, right? So graph both of the equations on the same coordinate plane below. And like you did before, convert each of the equations to slope-intercept form ("y=") while you're at it. Explain your result.



3. Solve the following pairs of equations using the **ANY** method. Check your solutions using both of the original equations.

Copy these problems into your notebook and solve. Check your solutions!

a) $$\begin{aligned} 3x-2y &= 6 \\ -6x+4y &= -12 \end{aligned}$$

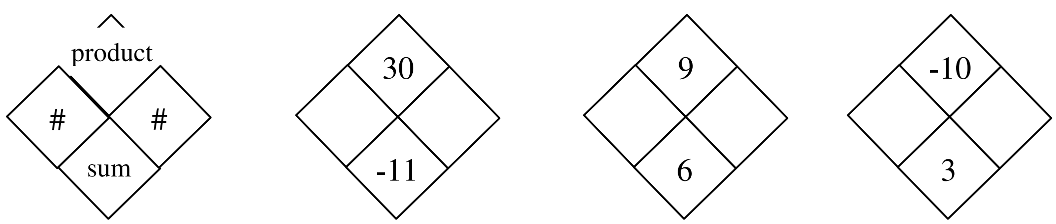
b) $$\begin{aligned} x-y &= 1 \\ -x+y &= 1 \end{aligned}$$

c) $$\begin{aligned} x+2y &= 6 \\ x+2y &= -6 \end{aligned}$$

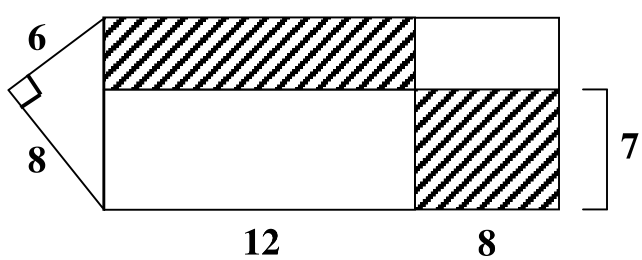
d) $$\begin{aligned} y &= -2x+4 \\ -4x-2y &= -8 \end{aligned}$$

Check your solution by substituting the point of intersection in **EACH** equation. If you get a weird result, explain whether the system contains means "many solutions" (same line) or "no solution" (parallel lines).

4. Solve each of the following diamond problems:



5. Find the area of the ***unshaded region*** of this figure (the sub-figures are 4 rectangles and a right triangle):



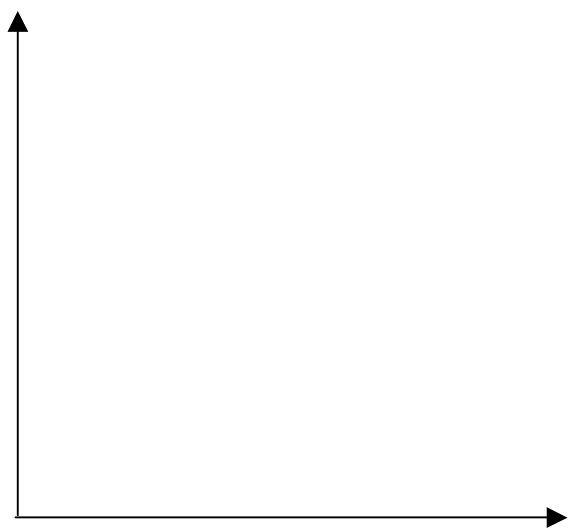
6. Two rental car companies are competing for business in Morristown. Drive-a-Dream charges \$35 and \$0.15 per mile while Rent-a-Ride charges \$20 and \$0.35 per mile. Which company should you choose?

(N.B. The cost of a rental is a ***function*** of the initial charge and the rate charged per mile. The cost of the rental is *dependent* upon the *independent* amounts charged by either of the two companies.)

a) Let x represent the number of miles and y represent the total cost. Write an equation that represents the charges to rent a car at each agency.

b) Use substitution to solve your two equations.

c) Graph both equations on the same set of axes. Label the point of intersection.



d) When is it best to rent from Drive-a-Dream? When is it best to rent from Rent-a-Ride? When does it make no difference?