+2

INTERMEDIATE ALGEBRA

GPS # 14 **4.1/4.2 SYSTEMS OF LINEAR EQUATIONS IN TWO VARIABLES I** **NAME:** [illegible]

Useful Guidelines:

* Solving a System by Elimination

Step 1: Write both equations in standard form $Ax + By = C$.

Step 2: Make the coefficients of one pair of variable terms opposites.

Step 3: Add the new equations to eliminate a variable. Then solve for the remaining variable.

\# When two lines intersect in a single point, the coordinates of this point give the only solution of the system. Then the system is consistent, and the equations are independent.

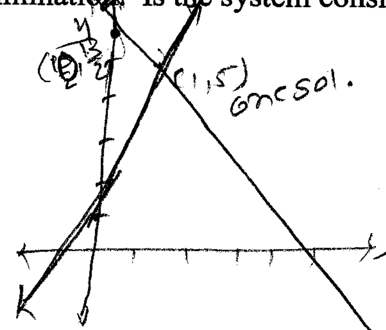
\# When the lines are parallel to each other, the system is inconsistent and the solution set is an empty set.

\# When the lines are overlapped on each other. The equations are dependent. The solution set is an infinite Set of ordered pairs representing the points on the line.

1. Solve each system by elimination. Is the system consistent, inconsistent or has dependent equations?

a) $3x + 2y = 13$
$(4x - y = -1)\cdot 2$

$\Rightarrow 3x + 2y = 13$ ①
$\Rightarrow 8x - 2y = -2$ ②
Add them ① + ②
$11x = 11$
$x = 1$
sub. $x = 1$ $3(1) + 2y = 13$
$3 + 2y = 13$
$2y = 13 - 3$
$y = 5$
Eq. are indepedent



(1,5) one sol.
System is consistent
one unique solution
sol. set $\{(x,y) \mid (1,5)\}$

b) $p + q = -5 \Rightarrow p + q = -5$ ①
$-1(-2p + q = 1) \Rightarrow 2p - q = -1$ ②
$3p = -6$ $p = -2$
Put $p = -2$ in $-2 + q = -5$
$q = -5 + 2$
$q = -3$
unique/one solution
(p, q) $(-2, -3)$
Sol. set $\{(p, q) \mid (-2, -3)\}$
System is consistent
Equations is independent

2. Solve each system by elimination. Is the system consistent, inconsistent or has dependent equations?

a) $(x + 3y = 4)\cdot 2 \Rightarrow 2x + 6y = 8$ ①
$-2x - 6y = 3 \Rightarrow -2x - 6y = 3$ ②
$0 \neq 11$ Not true

No. Solution,
System is inconsistence
because No solution
sol. set $= \{\ \}$ or Empty set or ϕ

b) $(2A - B = 3)\cdot(-3) \Rightarrow -6A + 3B = -9$ ①
$6A - 3B = 9 \Rightarrow 6A - 3B = 9$ ②
$0 = 0$ is true

2 line are overlapping
have Infinitely many sol.
System is consistence
Equations are dependent.
Sol. Set $\{(A, B) \mid 6A - 3B = 9\}$
(any one sol. for eq.)

3. Suppose a certain brand of laptop has supply and demand functions given by $p = 25q + 50$ and $p = 2800 - 30q$, respectively.

p - prise
q - Quantity

a) If the price p is \$350, how many units q are supplied and how many are demanded.

b) What price gives market equilibrium, and how many units are demanded and supplied at this price?

Ans. $q = 50$, P. \$1300

Supply (company)
$P = 25q + 50$
$350 = 25q + 50$
$300 = 25q$
$q = 12$ unit (company)

Demand (Buyer)
$P = 2800 - 30q$
$350 = 2800 - 30q$
$350 - 2800 = -30q$
$30q = 2450$
$q = 81.66$ unit
$q = 82$ Buyer

$(P - 25q = 50) \cdot -1 \Rightarrow -P + 25q = -50$
$P + 30q = 2800 \Rightarrow P + 30q = 2800$
$55q = 2750$
$q = 50$
Put $q = 50$ in
$P - 25(50) = 50$
$P - 1250 = 50$
$P = 50 + 1250$
$P = 1300$

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GPS # 15 4.1/4.2 SYSTEMS OF LINEAR EQUATIONS IN TWO VARIABLES II NAME: Parul Patel

Useful Guidelines and Definitions:

* Solving a System by Substitution
  1: Solve one of the equations for one of the variables.
  2: Substitute for that variable in the other equation.
  3: Solve the equation for that variable and substitute the result into the equation from step 1.

When two lines intersect in a single point, the coordinates of this point give the only solution of the system. Then the system is consistent, and the equations are independent.

When the lines are parallel to each other, the system is inconsistent and the solution set is an empty set.

When the lines are overlapped on each other. The equations are dependent. The solution set is an infinite Set of ordered pairs representing the points on the line.

1. Solve each system by substitution. Is the system consistent, inconsistent or has dependent equations?

a) $2x+3y=1 \Rightarrow 2x+3y=1$ — ①
$y-2x=0 \Rightarrow y=2x$ — ②

Sol. set $\{(x,y)/(\frac{1}{8},\frac{1}{4})\}$

System is consistent

Equations are independent

Sub ② into ①

$2x+3(2x)=1$

$2x+6x=1$

$x=\frac{1}{8}$

$y=2\cdot\frac{1}{8}$ $\quad y=\frac{1}{4}$

b) $x+2y=1 \Rightarrow x=1-2y$ — ①
$2x+4y=8 \Rightarrow 2x+4y=8$ — ②

Sol. set : $\{\}$

System is not consistend

Sub. ① into ②

$2(1-2y)+4y=8$

$2-4y+4y=8$

$2 \neq 8$

No solution.

2. Suppose you have \$500,000 to invest, part at 15% and the remainder in a less risky investment at 6%. If your investment goal is to have an annual income of \$42,000, how much should you put in each investment? [Let x be the amount invested at 15% and y be the amount invested at 6%.]

.15
.06
09

\$500,000 ← 15% (x)
6% (y)

gain 42,000

$x+y=500,000 \Rightarrow x=500,00-y$ ①

$0.15x+0.06y=42,000 \Rightarrow$ ②

Sub. ① into ②

$0.15(50000-y)+0.06y=42,000$

$75000-0.15y+0.06y=42,000$

$-0.09y=42,000-75,000$

$y=\frac{-33000}{-0.09}$

$y=366,666.67$

$x+366,666.67=500,000$

$x=133333.33$

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GPS # 16 **4.3 SYSTEMS OF LINEAR INEQUALITIES** **NAME:** Parul Patel

Useful Guidelines:

To graph a Linear Inequality:

1. Graph the line (make the line solid if the inequalities involves $\leq$ or $\geq$, or make the line dash if inequalities involves $<$ or $>$).
2. Pick a point not on the line as a test point and substitute the coordinates in the inequality.
3. Shade the side of the line that includes the test point if the test point satisfies the original inequality; otherwise, shade the region on the other side of the boundary line.

1. Graph each linear inequality in two variables. Label all the points.

a) $x+2y\leq 6$

Let $x+2y=6 \Rightarrow 2y=-x+6$ (line going down passing (0,3))

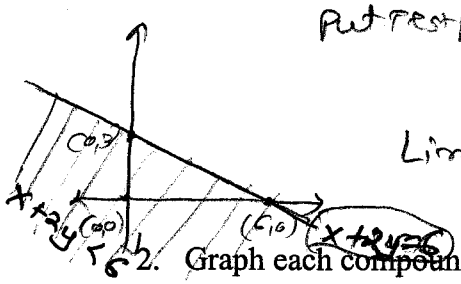
$y=-\frac{1}{2}x+3$

Put test point (0,0) Plug in Eqn

$0+0\leq 6$

$0<6$

Line is your equation ∵ equal sign.

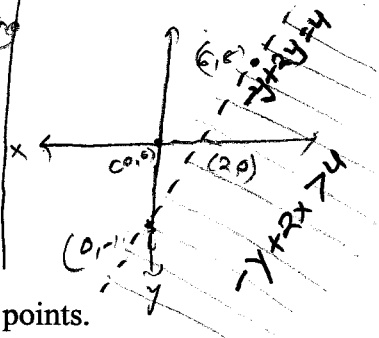


b) $-y+2x>4$ Let $-y+2x=4$

$-y=4-2x$ $y=2x-4$

x	y
0	-4
2	0
6	0

Be equation



$0+0>4$ Not true

So neat!

2. Graph each compound inequality. Label all the points.

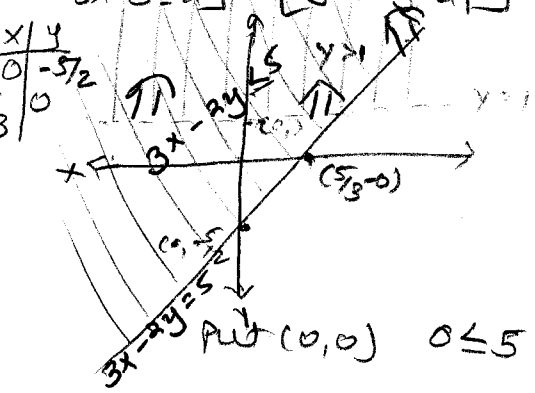
a) $3x-2y\leq 5$ and $y>1$

Let $3x-2y=5$ (Straight line going up)

$3x-5=2y$

x	y
0	-5/2
3	0

∩ Let $y=1$



Put (0,0) $0\leq 5$

b) $-y+x\geq 4$ and $x\geq 3$ Let

Let $-y+x=4$ ∩ $x=3$

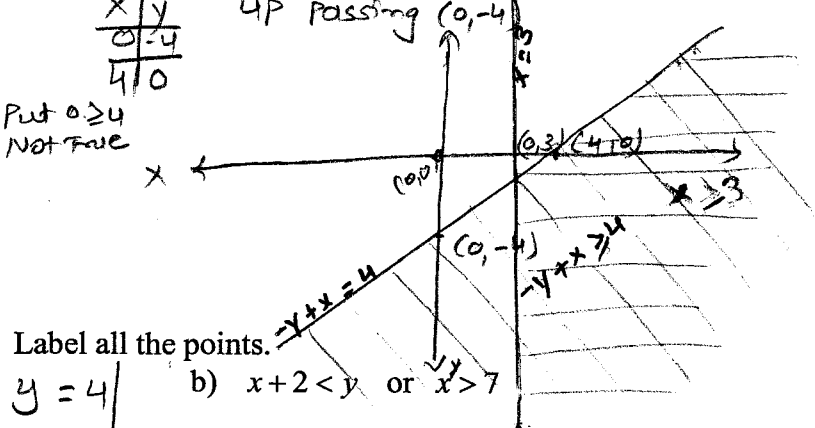
$-y=-x+4$

$y=x-4$

Straight line going up passing (0,-4)

x	y
0	-4
4	0

Put $0\geq 4$ Not True



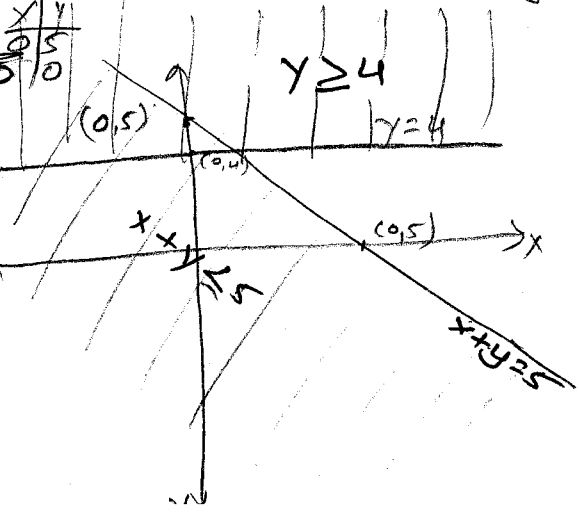
3. Graph each compound inequality. Label all the points.

a) $x+y\leq 5$ or $y\geq 4$ ∪ Let $y=4$

Let: $y=-x+5$

line going down passing (0,5)

x	y
5	0
0	5

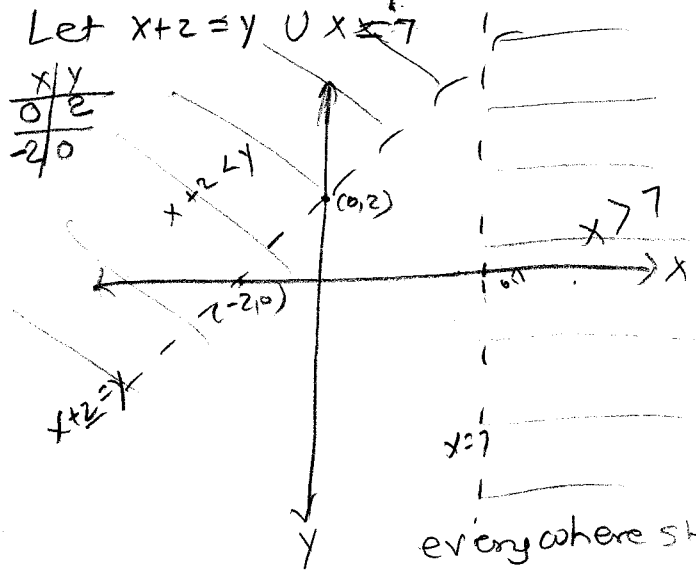


Everywhere shaded

b) $x+2<y$ or $x>7$

Let $x+2=y$ ∪ $x=7$

x	y
0	2
-2	0



everywhere shaded