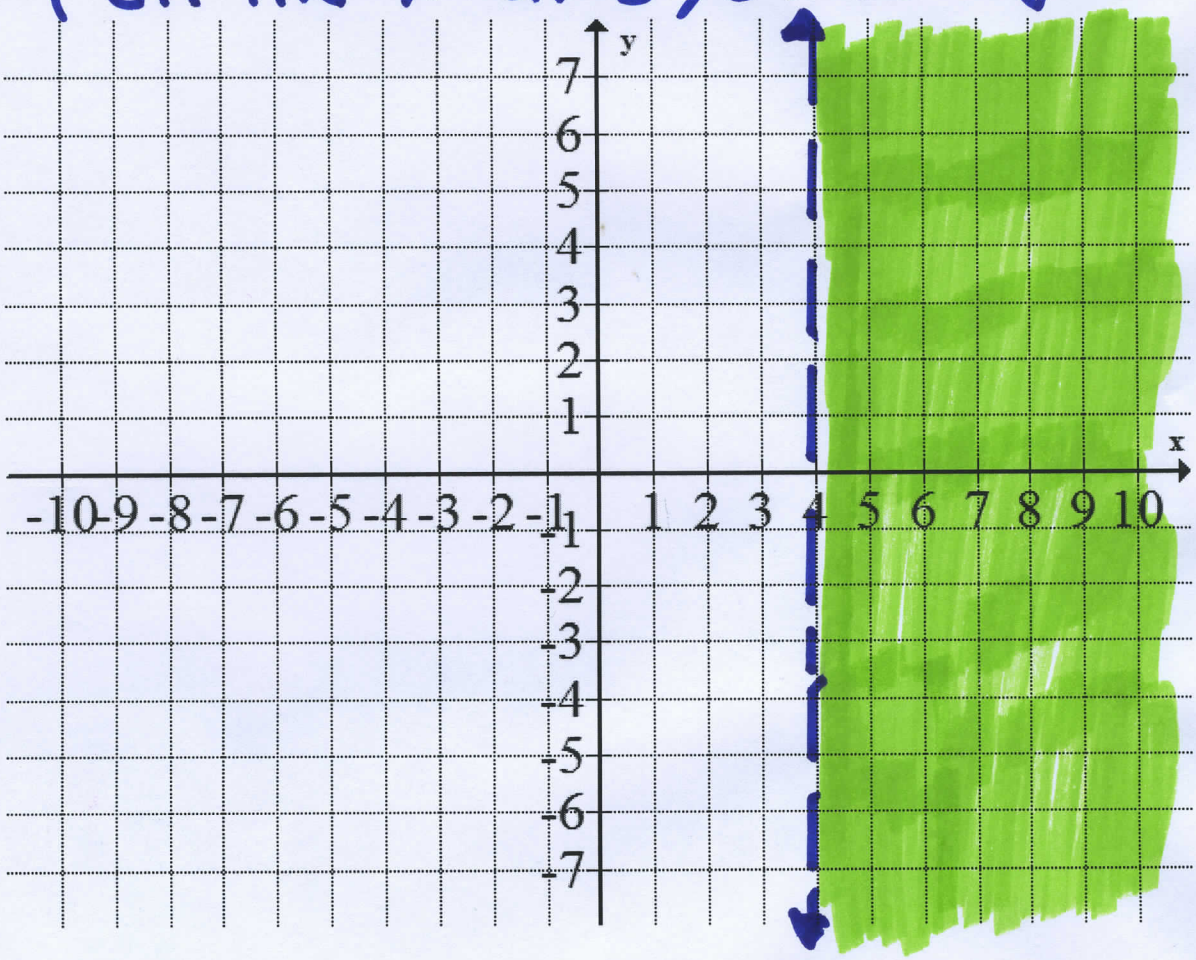
Section 8.6 Solutions

Section 8.6: Systems of Inequalities

#1-24: graph each inequality

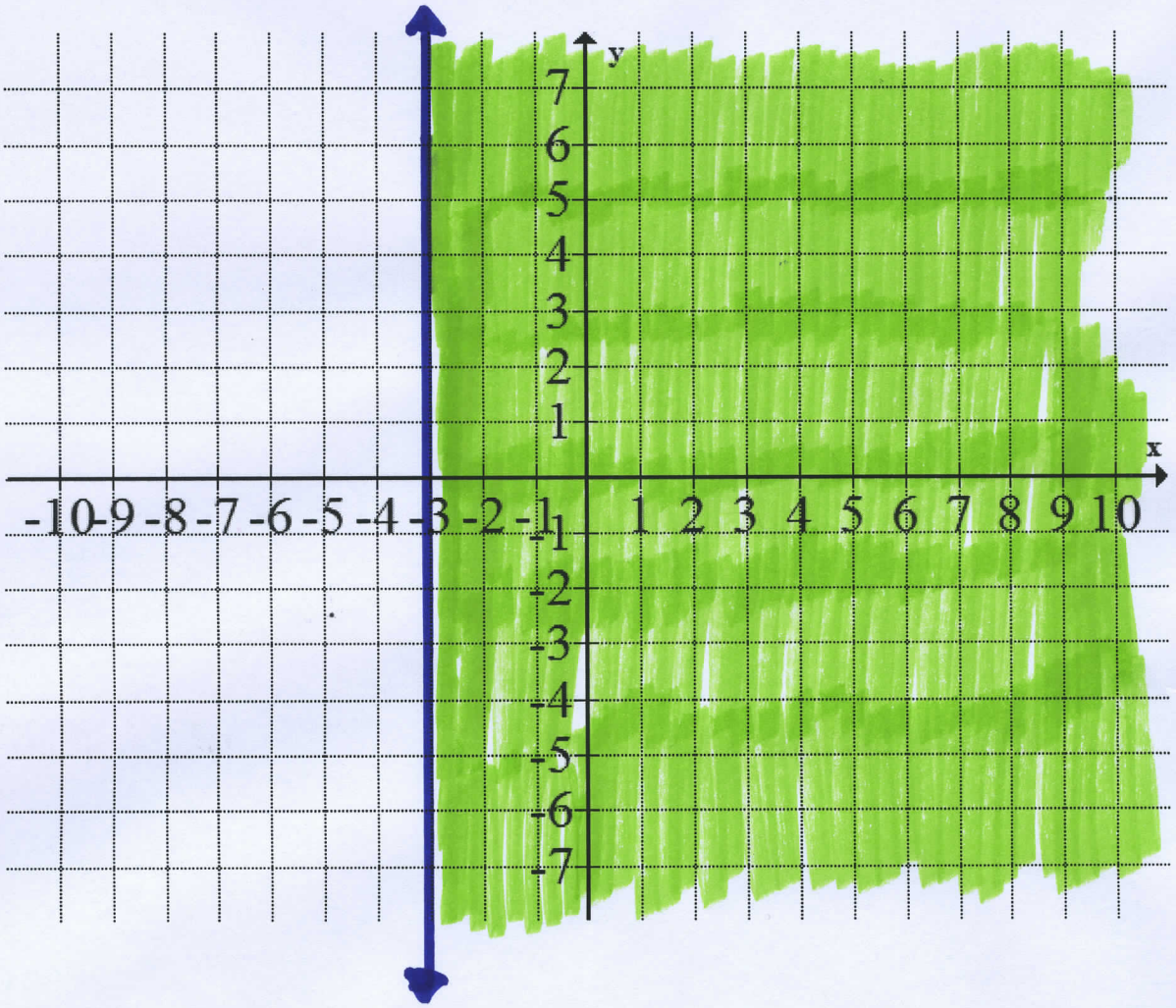
1) $x > 4$

Draw a DASHED vertical line Through 4 on the X-axis, Shade Right



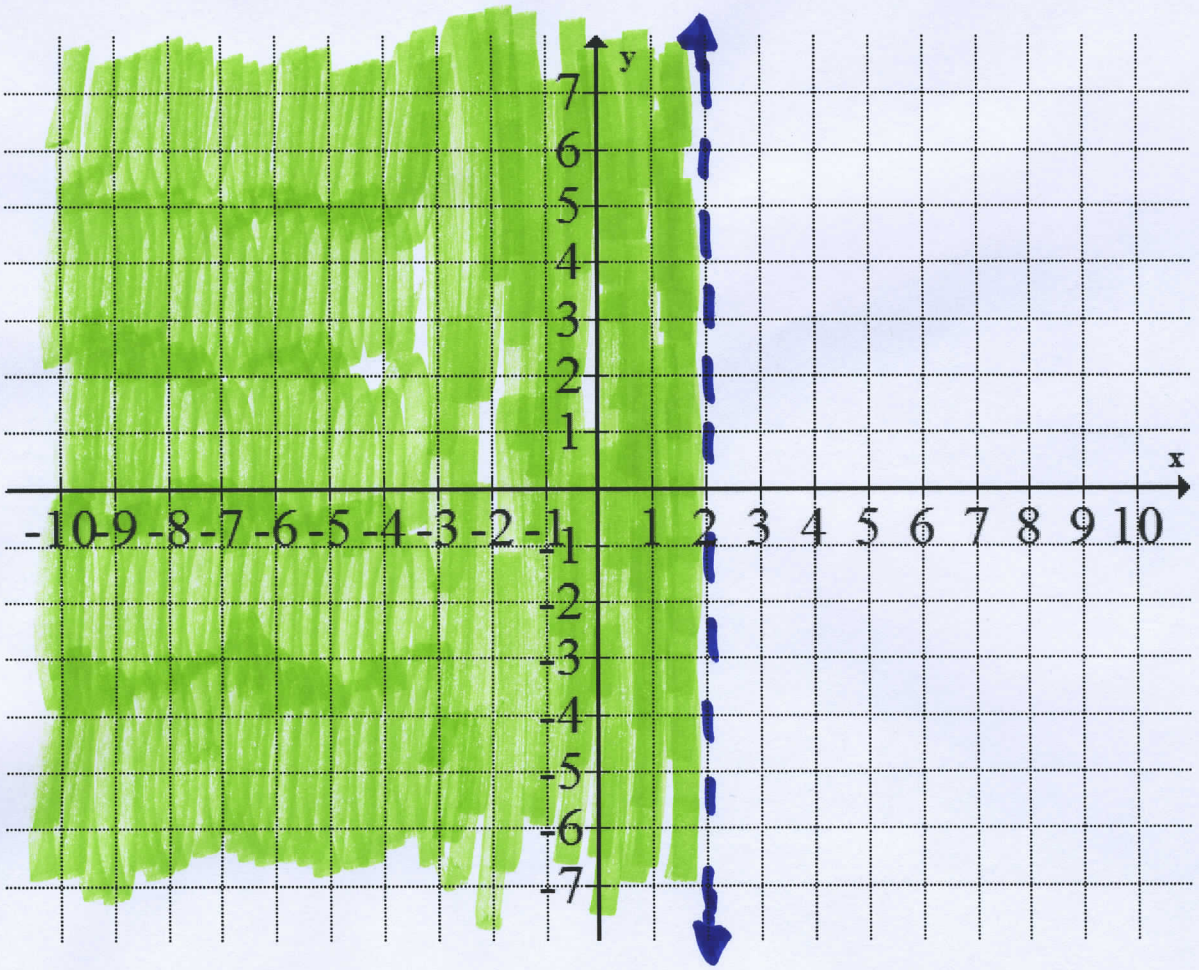
3) $x \geq -3$

Draw a Solid VERTICAL line through -3 on the x-Axis, Shade Right.



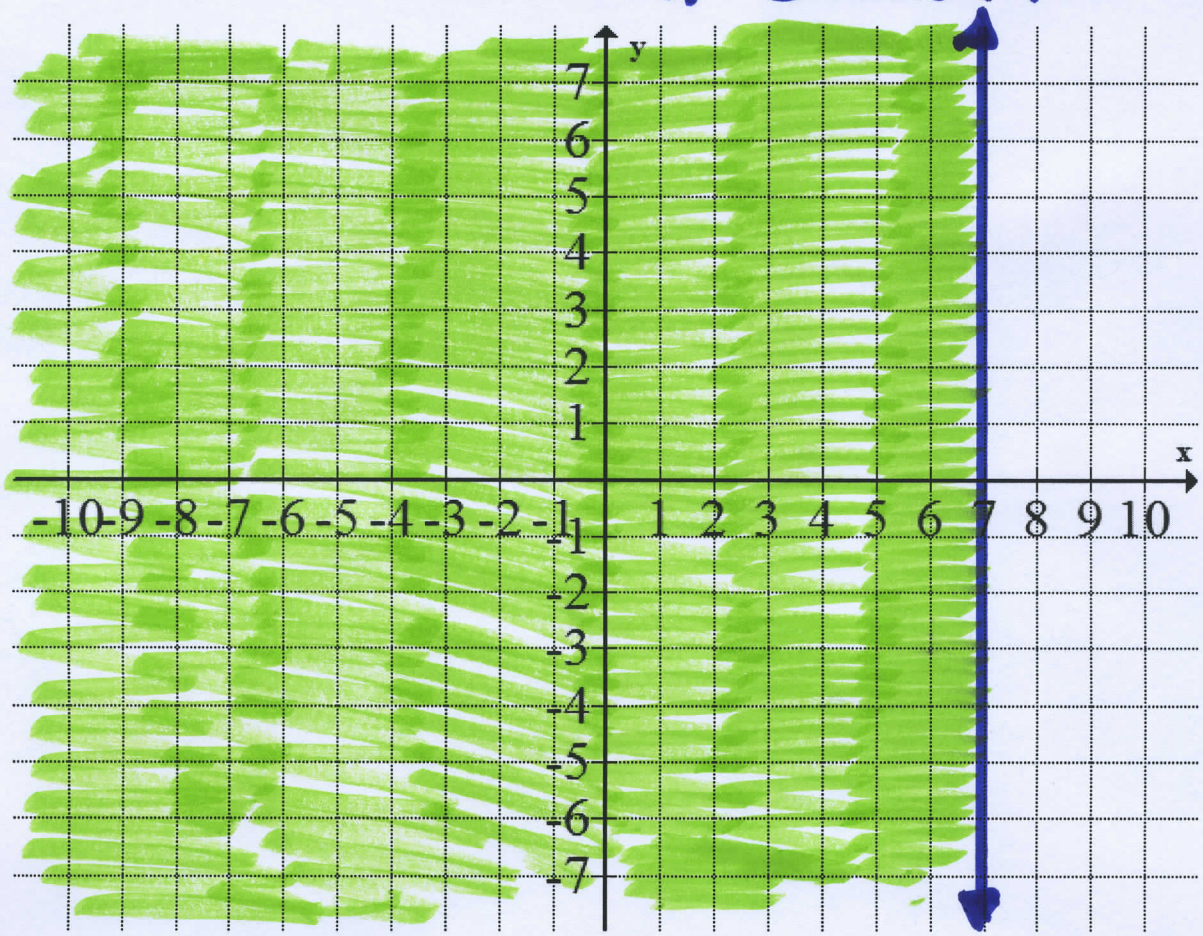
5) $x < 2$

DRAW a DASHED VERTICAL line through 2 on the X-Axis Shade left



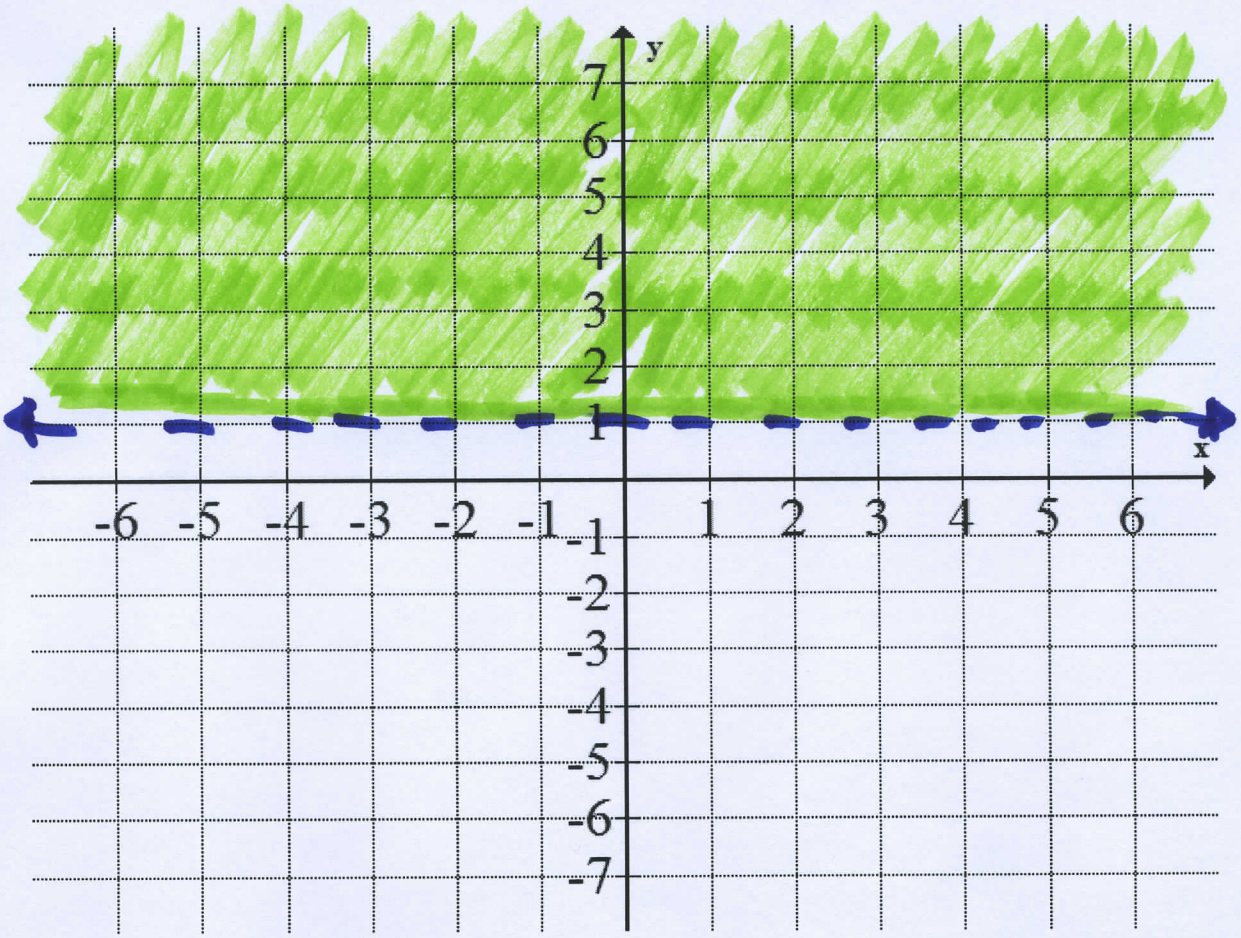
7) $x \leq 7$

DRAW a SOLID VERTICAL line through 7 on the X-AXIS. Shade left.



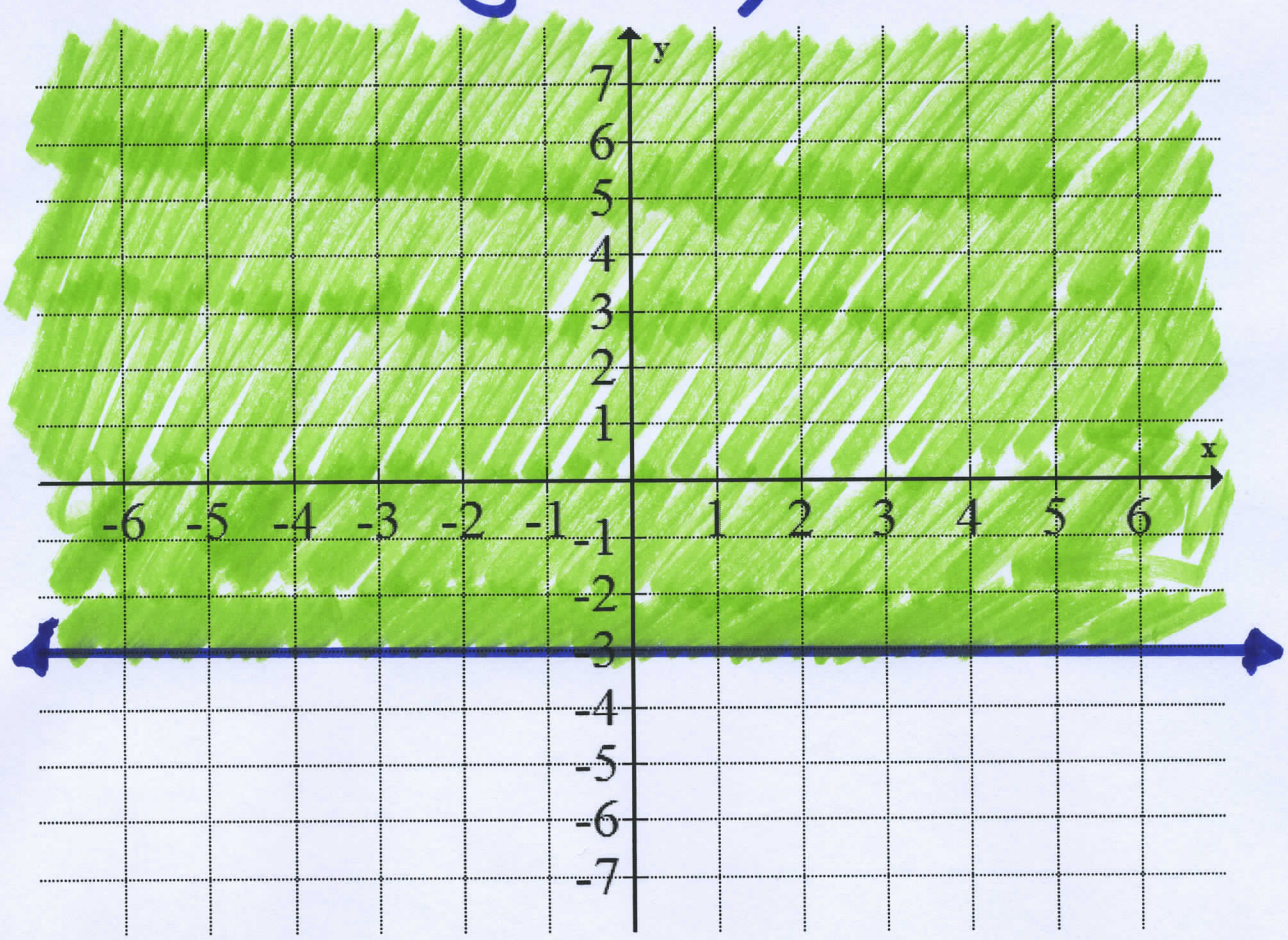
9) $y > 1$

Draw a DASHED horizontal line through 1 on the y-axis, Shade up.



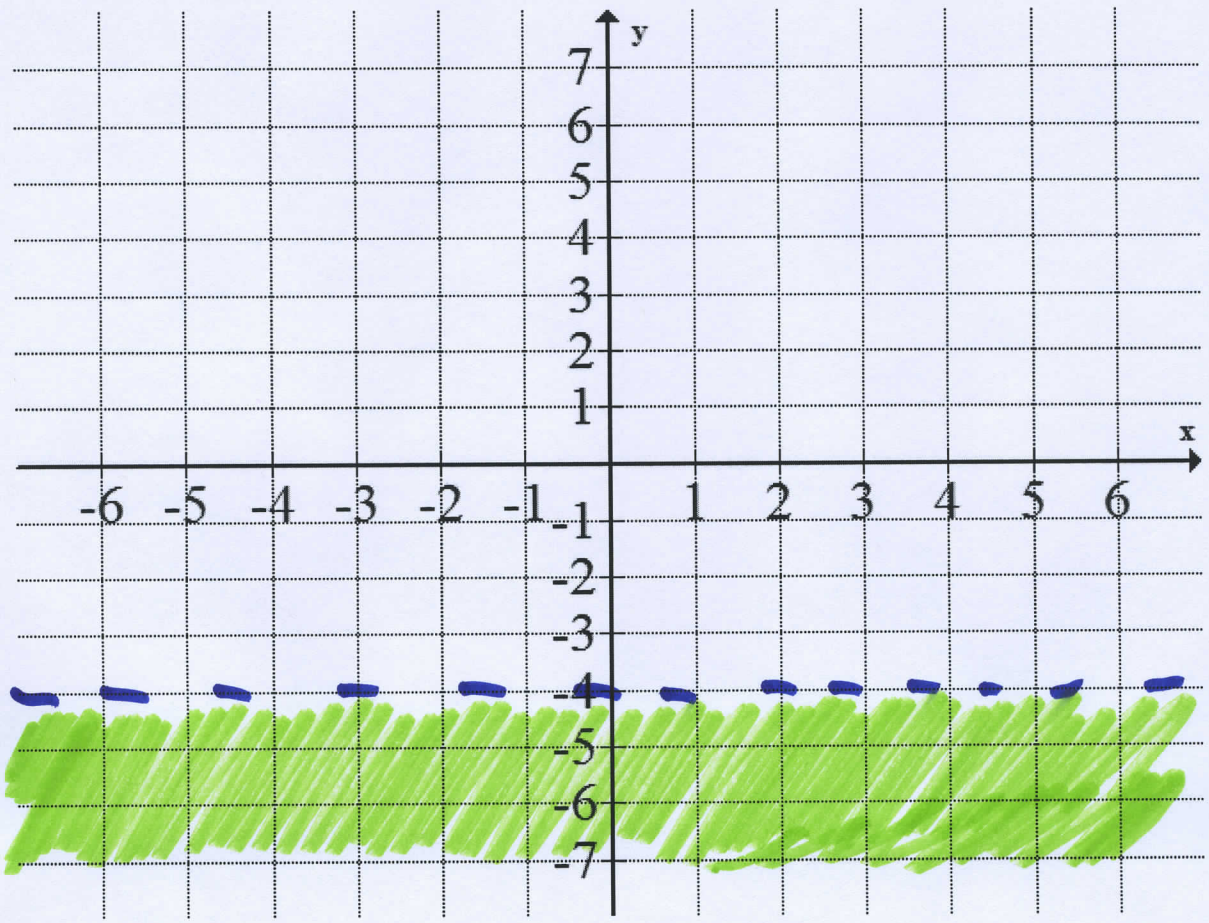
11) $y \geq -3$

Draw a Solid Horizontal line through -3 on the y-Axis, Shade up.



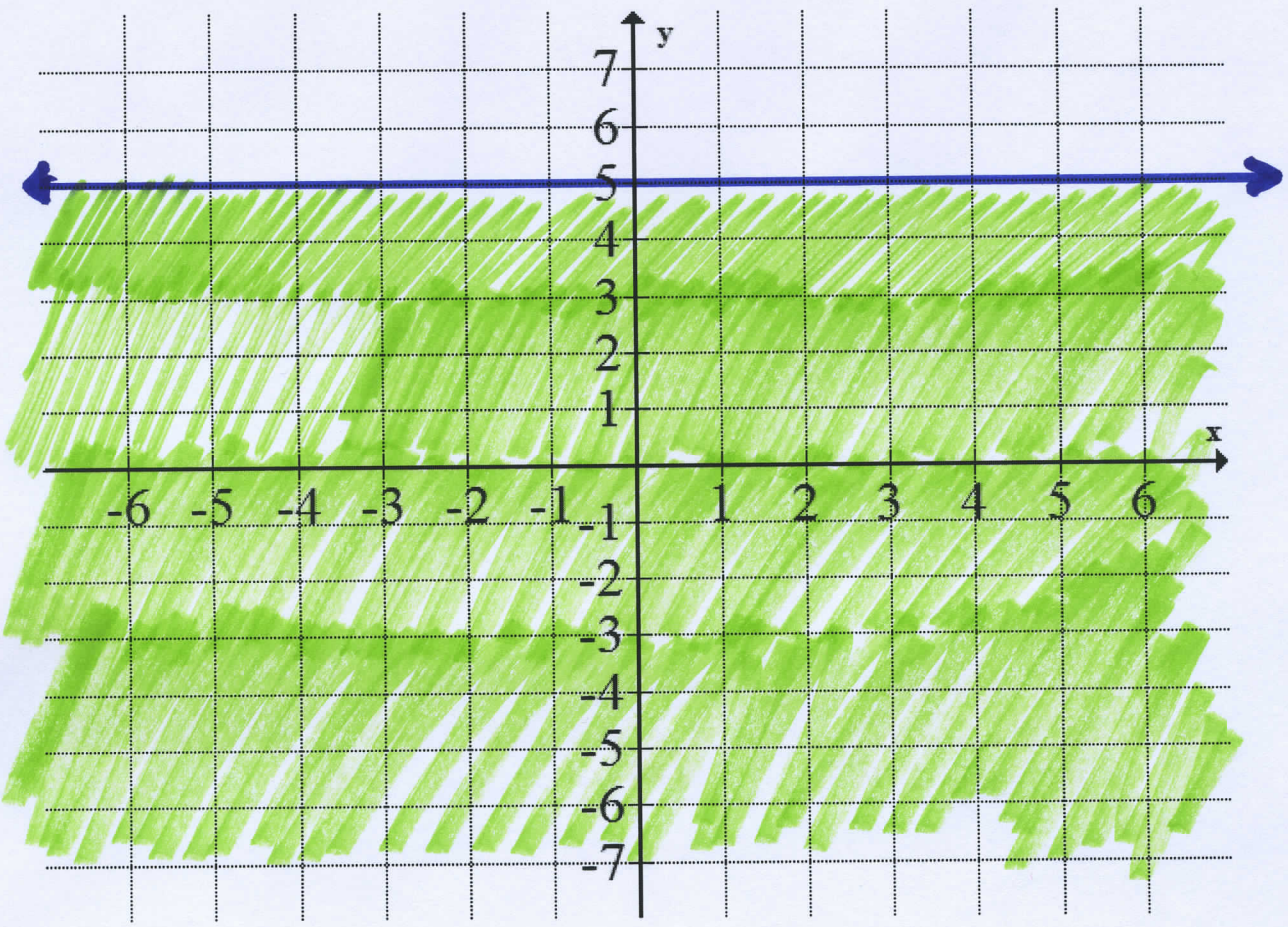
13) $y < -4$

Draw Dashed horizontal line through (-4) on the y-axis, Shade Down.

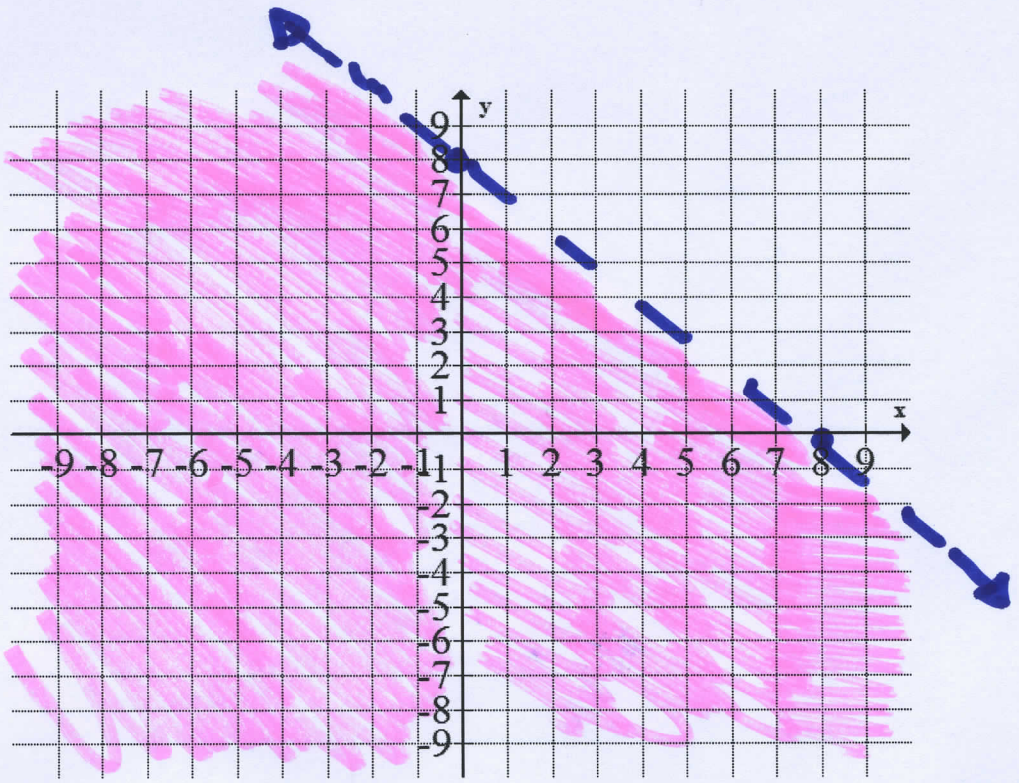


15) $y \leq 5$

Draw a Solid horizontal line Through 5 on the y-axis, Shade Down.



17) $x + y < 8$



1ST FIND X,Y INTERCEPTS graph DASHED

$X+y=8$

X	y
0	8
8	0

$0+y=8$ | $X+0=8$

$y=8$ | $X=8$

2ND TEST (7,0) & (9,0)

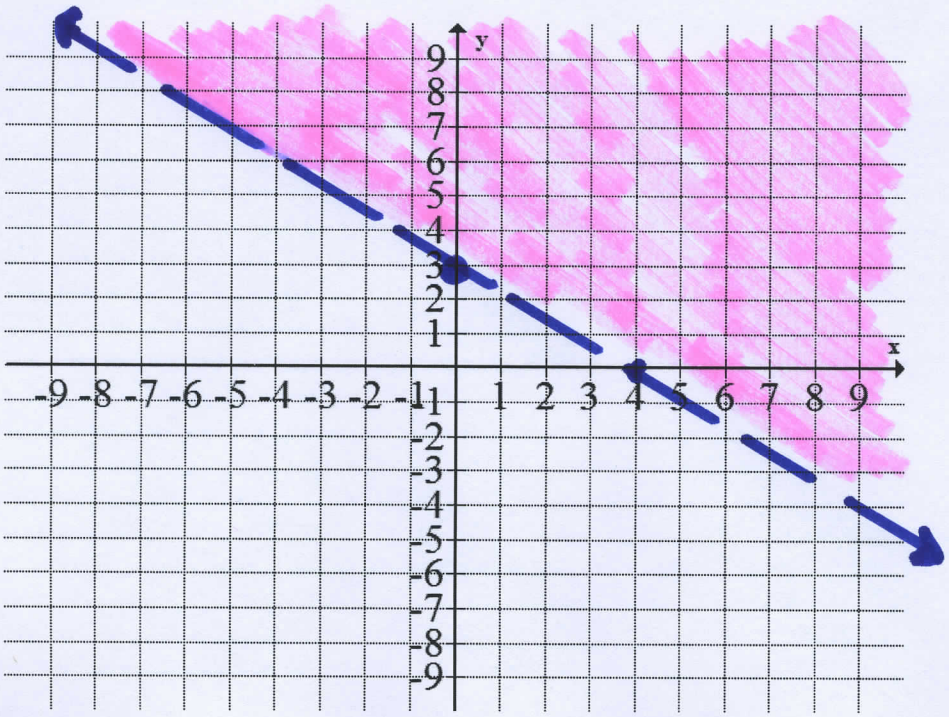
$7+0<8$ | $9+0<8$

$7<8$ | $9<8$

TRUE | FALSE

SHADE TOWARDS (7,0)

19) $3x + 4y > 12$



1ST FIND X,Y INTERCEPTS graph Dashed

$3x+y=12$

x	y
0	3
4	0

$3(0)+4y=12$

$4y=12$

$y=3$

$3x+4(0)=12$

$3x=12$

$x=4$

2ND TEST.

(3,0)

$3(3)+4(0)>12$

$9>12$

FALSE

(5,0)

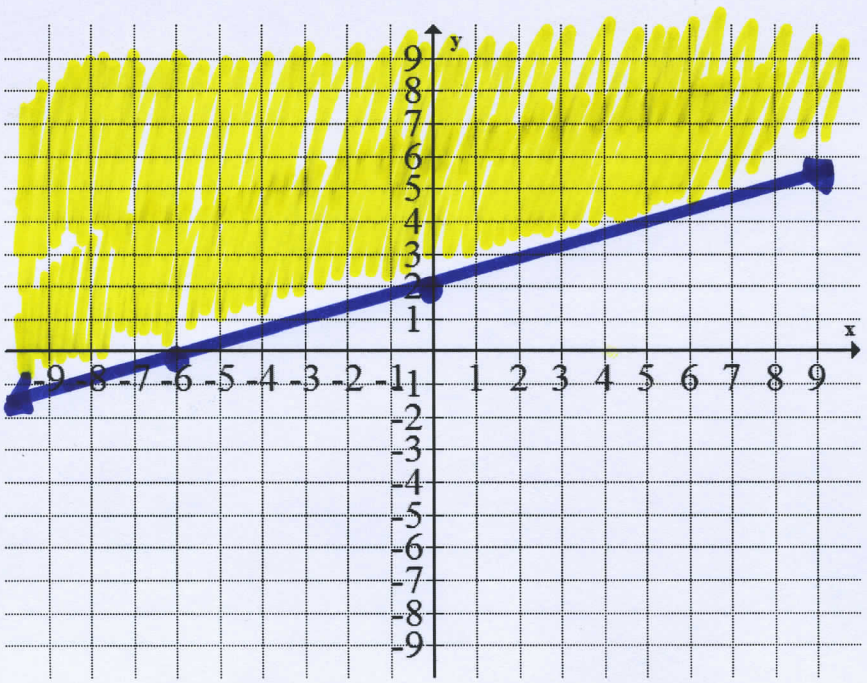
$3(5)+4(0)>12$

$15>12$

TRUE

SHADE TOWARDS (5,0)

21) $x - 3y \leq -6$



1ST FIND X, Y INTERCEPTS graph Solid

$X - 3y = -6$

X	y
0	2
-6	0

$0 - 3y = -6$

$-3y = -6$

$y = 2$

$X - 3(0) = -6$

$X = -6$

2ND TEST/Shade

(-7,0)

$-7 - 3(0) \leq -6$

$-7 \leq -6$

TRUE

(-5,0)

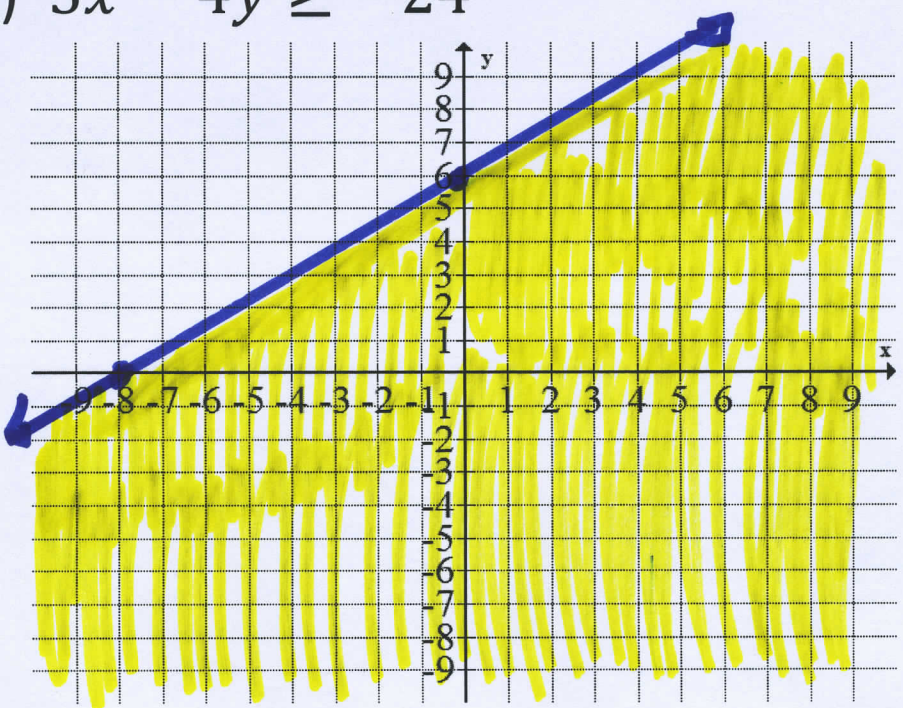
$-5 - 3(0) \leq -6$

$-5 \leq -6$

FAISE

SHADE TOWARDS (-7,0)

23) $3x - 4y \geq -24$



1ST FIND X,y INTERCEPTS Graph Solid $3x-4y=-24$

x
0
-8

6
0

$3(0)-4y=-24$

$\frac{-4y}{-4} = \frac{-24}{-4}$

$y=6$

$3x-4(0)=-24$

$3x=-24$

$x=-8$

2ND TEST / Shade

(-9,0)

$3(-9)-4(0) \geq -24$

$-27 \geq -24$

FALSE

(-7,0)

$3(-7)-4(0) \geq -24$

$-21 \geq -24$

TRUE, Shade Towards (-7,0)

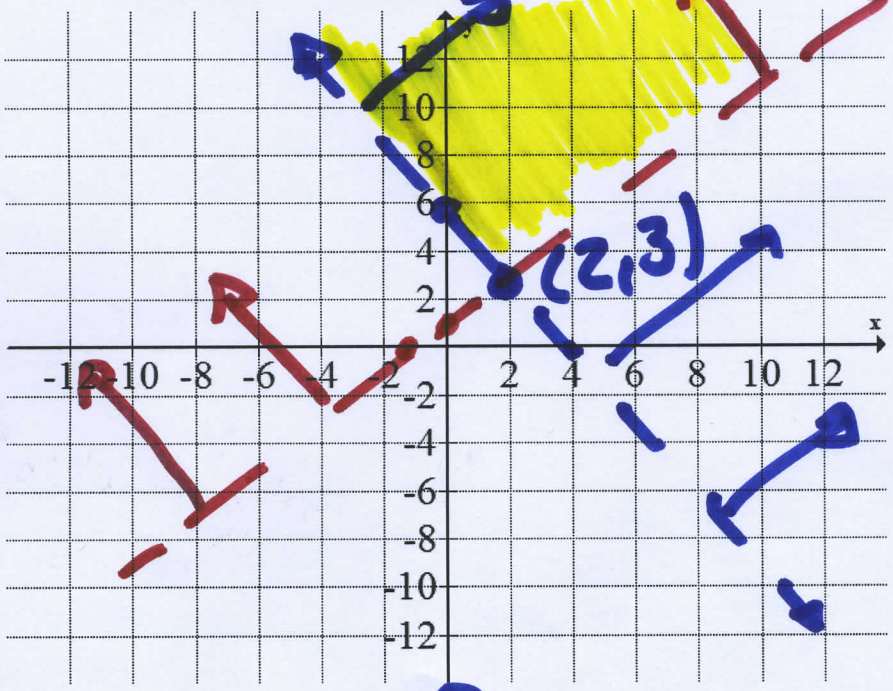
#25-30: graph each system of inequalities.

Label the point of intersection.

25) $3x + 2y > 12$ BLUE

$x - y < -1$ RED

ALGEBRA ON NEXT PAGE



USE $\begin{bmatrix} 3 & 2 & 12 \\ 1 & -1 & -1 \end{bmatrix}$

RREF(A) TO FIND POINT OF INTERSECTION

25

$3x+2y>12$

Find x, y INTERCEPTS; graph Dashed $3x+2y=12$

x	y
0	6
4	0

$3(0)+2y=12$
$2y=12$
$y=6$

$3x+2(0)=12$
$3x=12$
$x=4$

TEST (3,0) (5,0) FOR Shading

$3(3)+2(0)>12$
$9>12$
FALSE

$3(5)+2(0)>12$
$15>12$
TRUE

SHADE TOWARDS (5,0)

25] $x - y < -1$ (graphed in RED)

Find x, y INTERCEPTS graph

Dashed $x - y = -1$

x	y
0	1
-1	0

$0 - 1y = -1$

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

$y = 1$

$x - 0 = -1$

$x = -1$

TEST (-2, 0) & (0, 0) FOR SHADING

$-2 - 0 < -1$

$-2 < -1$

TRUE

$0 - 0 < -1$

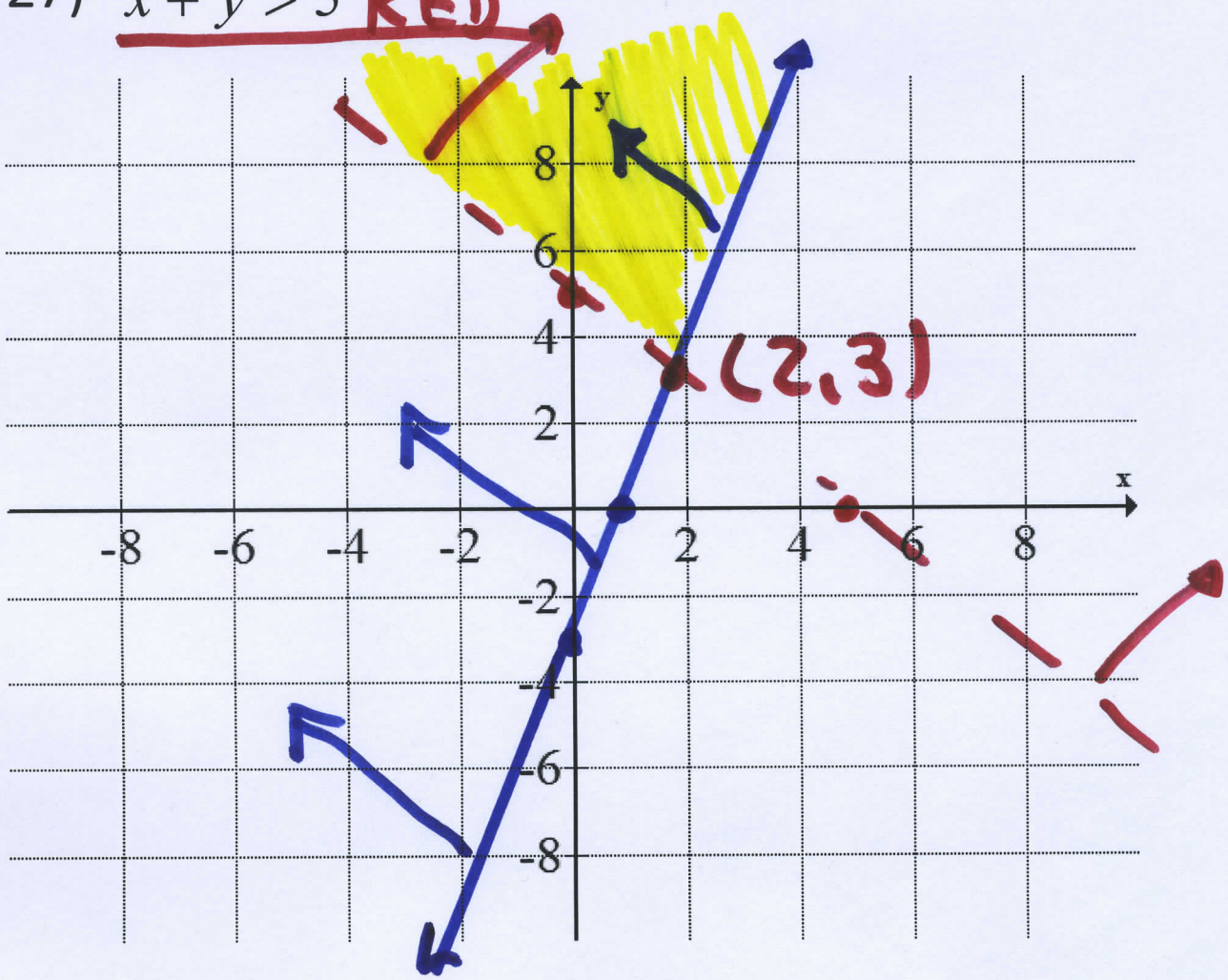
$0 < -1$

FALSE

SHADE TOWARDS (-2, 0)

27) $6x - 2y \leq 6$ BLUE

$x + y > 5$ RED



To Find Point of Intersection use RREF(A)

$$\left[\begin{array}{cc|c} 6 & -2 & 6 \\ 1 & 1 & 5 \end{array}\right]$$

27) $6x-2y \leq 6$

Find x,y INTERCEPTS Draw Solid line $6x-2y=6$

x	y
0	-3
1	0

$6(0)-2y=6$
$-2y=6$
$y=-3$

$6x-2(0)=6$
$6x=6$
$x=1$

TEST & Shade

(0, 0)

$6(0)-2(0) \leq 6$
$0 \leq 6$
TRUE

(2, 0)

$6(2)-2(0) \leq 6$
$12 \leq 6$
FAISE

SHADE TOWARDS (0, 0)

27) $x+y>5$

Find x, y intercepts Draw Dashed line $x+y=5$

x	y
5	0
0	5

$0+y=5$ | $x+0=5$

$y=5$ | $x=5$

Test (4,0) & (6,0) Shade

$4+0>5$

$4>5$

FALSE

$6+0>5$

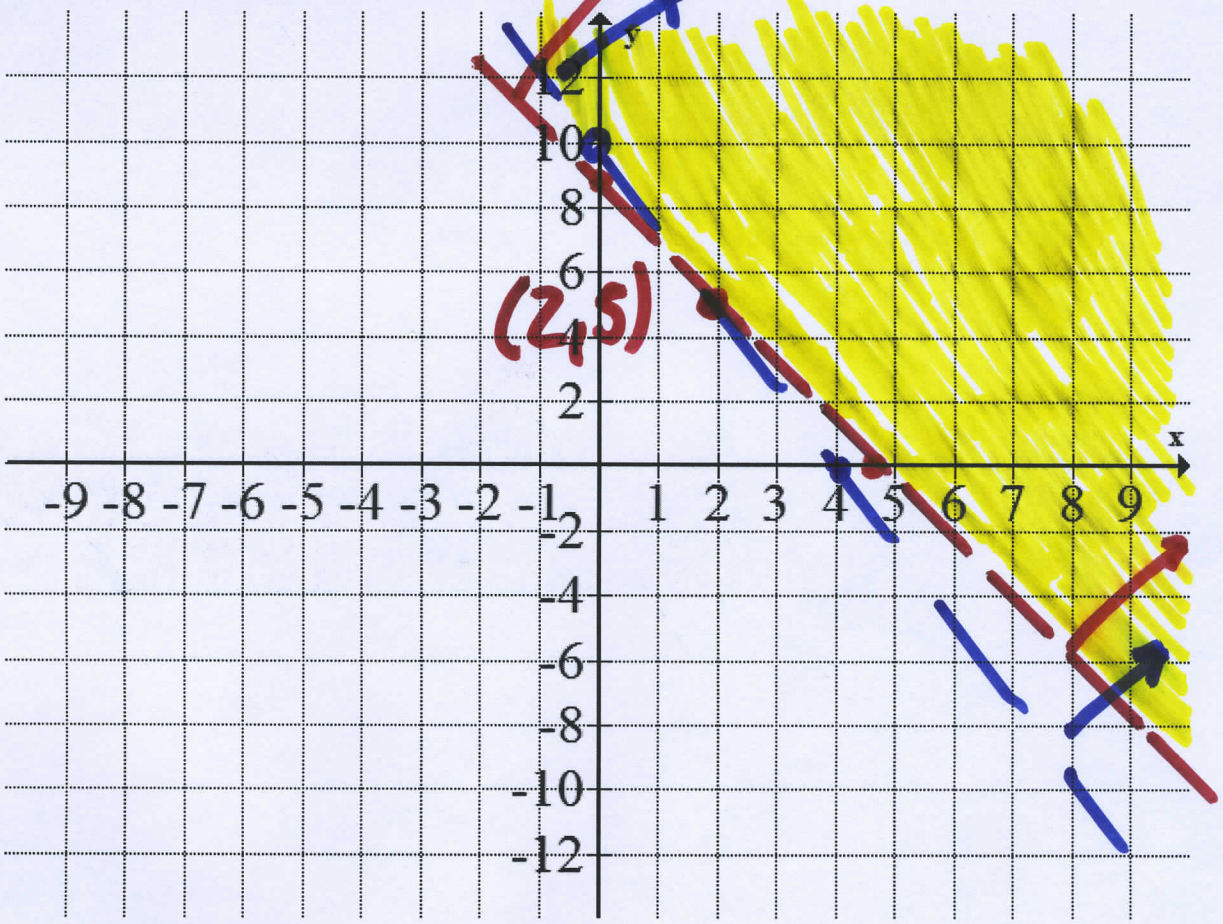
$6>5$

TRUE

Shade Towards (6,0)

29) $5x + 2y > 20$ BLUE

$2x + y > 9$ RED



USE RREF(A) TO FIND POINT OF INTERSECTION

29) $5x+2y>20$

Find x, y INTERCEPTS Draw Dashed $5x+2y=20$

x	y
0	10
4	0

$5(0)+2y=20$
$2y=20$
$y=10$

$5x+2(0)=20$
$5x=20$
$x=4$

TEST and Shade

(3,0)

$5(3)+2(0)>20$
$15>20$
FALSE

(5,0)

$5(5)+2(0)>20$
$25>20$
TRUE

SHADE TOWARDS (5,0)

29) $2x+y>9$

Find x, y intercepts Draw Dashed $2x+y=9$

x	y
0	9
4.5	0

$2(0)+y=9$

$y=9$

$2x+0=9$

$2x=9$

$x=9/2$

$x=4.5$

Test (4,0) (5,0) Shade

$2(4)+0>9$

$8>9$

False

$2(5)+0>9$

$10>9$

True

Shade towards (5,0)

Section 8.6: Systems of Inequalities

40

#31-~~42~~: graph each system of linear inequalities by hand. Label the corner points.

31)

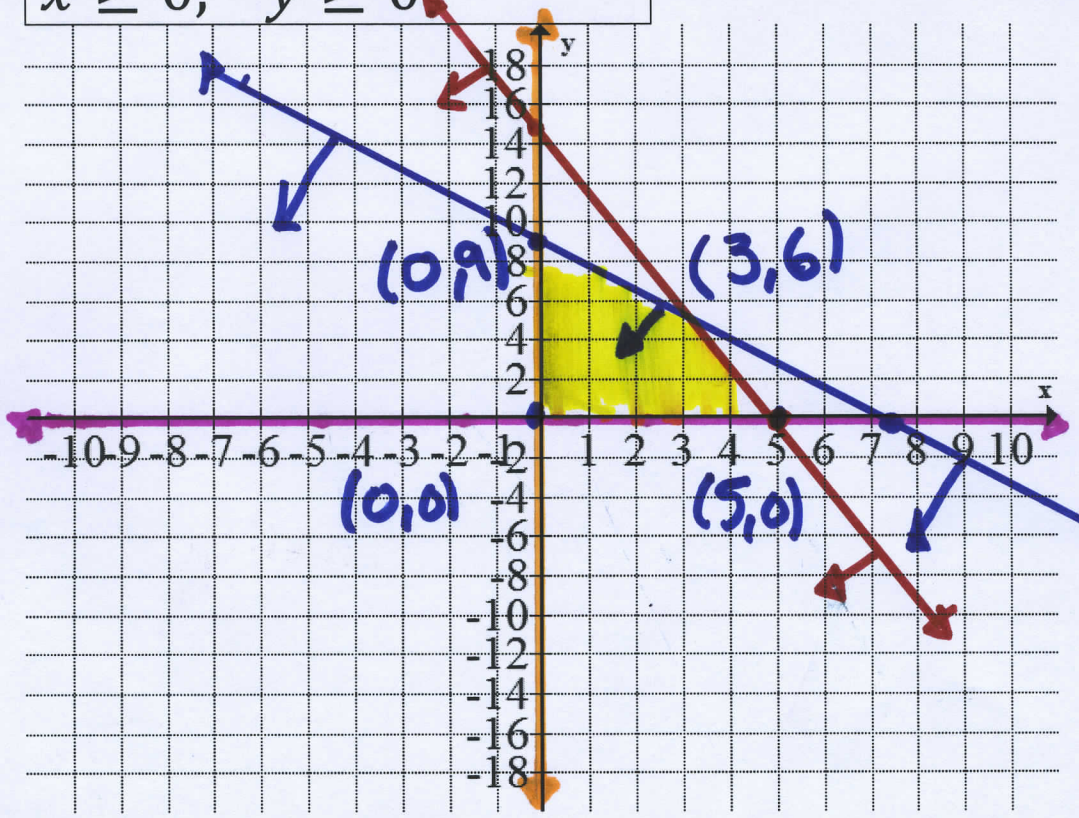
$x + y \leq 9$ Blue

$3x + y \leq 15$ Red

$x \geq 0, \quad y \geq 0$

$x \geq 0$ Solid line y-axis, Shade Right

$y \geq 0$ Solid line x-axis Shade up



Corner Points

(0,0)
(5,0)
(0,9)
(3,6)

See next page for Explanation

For Intersection Point RREF(A)

$$\begin{bmatrix} 1 & 1 & 9 \\ 3 & 1 & 15 \end{bmatrix}$$

31) $x+y \leq 9$

Find x, y intercepts.
Graph $x+y=9$ with solid line

x	y
0	9
9	0

$0+y=9$ $\quad$ $x+0=9$

$y=9$ $\quad$ $x=9$

Shading test

(10, 0) $\quad$ (8, 0)

$10+0 \leq 9$ $\quad$ $8+0 \leq 9$

$10 \leq 9$ $\quad$ $8 \leq 9$

FALSE $\quad$ TRUE

Shade towards (8, 0)

Keep shading in 1st quadrant

Because of $x \geq 0$, $y \geq 0$

31) $3x+y \leq 15$

FIND x, y INTERCEPTS $3x+y=15$

Draw Solid Line

x	y
0	15
5	0

$3(0)+y=15$

$y=15$

$3x+0=15$

$3x=15$

$x=5$

Shading TEST

(4,0)

$3(4)+0 \leq 15$

$12 \leq 15$

True

(6,0)

$3(6)+0 \leq 15$

$18 \leq 15$

FALSE

SHADE TOWARDS (0,0) KEEP

Shading in 1ST QUADRANT

Because of $x \geq 0$, $y \geq 0$

$x \geq 0$
Solid line Y-Axis
Shade Right

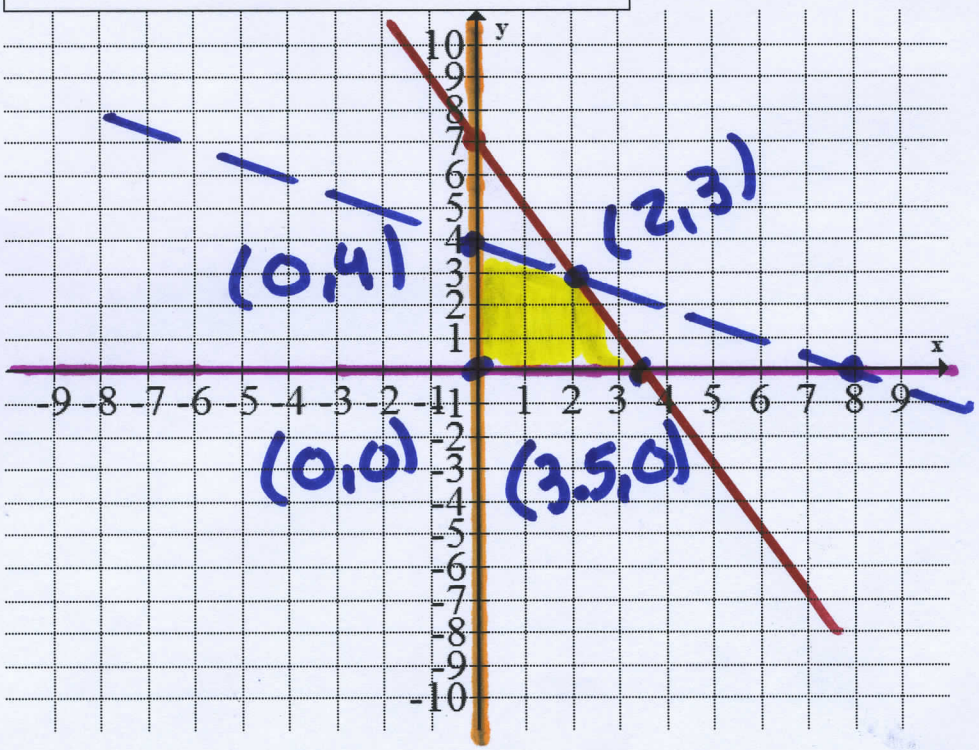
$y \geq 0$ Solid line
X-axis Shade up

33)

$x + 2y \leq 8$ Blue

$2x + y \leq 7$ Red

$x \geq 0, \quad y \geq 0$



Corner Points

(0,4)
(2,3)
(0,0)
(3.5,0)

Use RREF(A) $\begin{bmatrix} 1 & 2 & 8 \\ 2 & 1 & 7 \end{bmatrix}$ TO

get point of Intersection

(2,3)

33) $x+2y<8$

Find x, y Intercepts $x+2y=8$

Draw Dashed line

x	y
0	4
8	0

$0+2y=8$

$2y=8$

$y=4$

$x+2(0)=8$

$x=8$

Shading Test

(7,0)

$7+2(0)<8$

$7<8$

TRUE

(9,0)

$9+2(0)<8$

$9<8$

FALSE

Shade towards (7,0)

Keep shading in 1st Quadrant

Because of $x\geq 0$, $y\geq 0$

33) $2x+y \leq 7$

Find x, y intercepts $2x+y=7$

Draw Solid Line

3.5	0
0	7

$2(0)+y=7$

$y=7$

$2x+0=7$

$2x=7$

$x=7/2$

$x=3.5$

Shading Test

(3,0)

$2(3)+0 \leq 7$

$6 \leq 7$

TRUE

(4,0)

$2(4)+0 \leq 7$

$8 \leq 7$

FALSE

Shade towards (3,0)

Keep Shading in First Quadrant

Because of $x \geq 0, y \geq 0$

35)

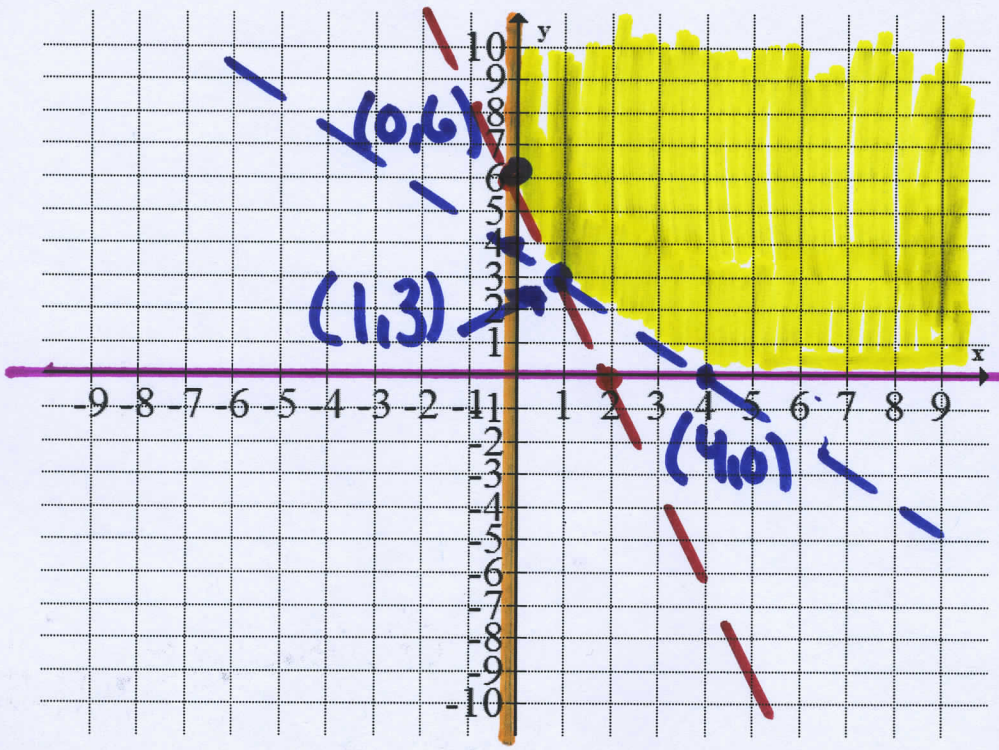
$x + y > 4$ Blue

$3x + y > 6$ Red

$x \geq 0, \quad y \geq 0$

$x \geq 0$
Solid line y-Axis
Shade Right

$y \geq 0$
Solid line X-Axis
Shade up



Corner Points

(4,0)

(1,3)

(0,6)

USE RREF(A) $\begin{bmatrix} 1 & 1 & 4 \\ 3 & 1 & 6 \end{bmatrix}$

TO FIND INTERSECTION POINT OF (1,3)

35] $x+y>4$

Find x, y INTERCEPTS $x+y=4$

Draw Solid line

x	y
0	4
4	0

$0+y=4$ $\quad x+0=4$

$y=4$ $\quad x=4$

Shading TEST

(3,0) $\quad$ (5,0)

$3+0>4$ $\quad 5+0>4$

$3>4$ $\quad 5>4$

FALSE $\quad$ TRUE

SHADE TOWARDS (5,0)

Keep Shading In FIRST QUADRANT

Because $x \geq 0$, $y \geq 0$

35) $3x+y>6$

Find x, y INTERCEPTS $3x+y=6$

Draw DASHED line

x	y
2	0
0	6

$3x+0=6$

$3x=6$

$x=2$

$3(0)+y=6$

$y=6$

Shading TEST

(1, 0)

$3(1)+0>6$

$3>6$

FALSE

(3, 0)

$3(3)+0>6$

$9>6$

TRUE

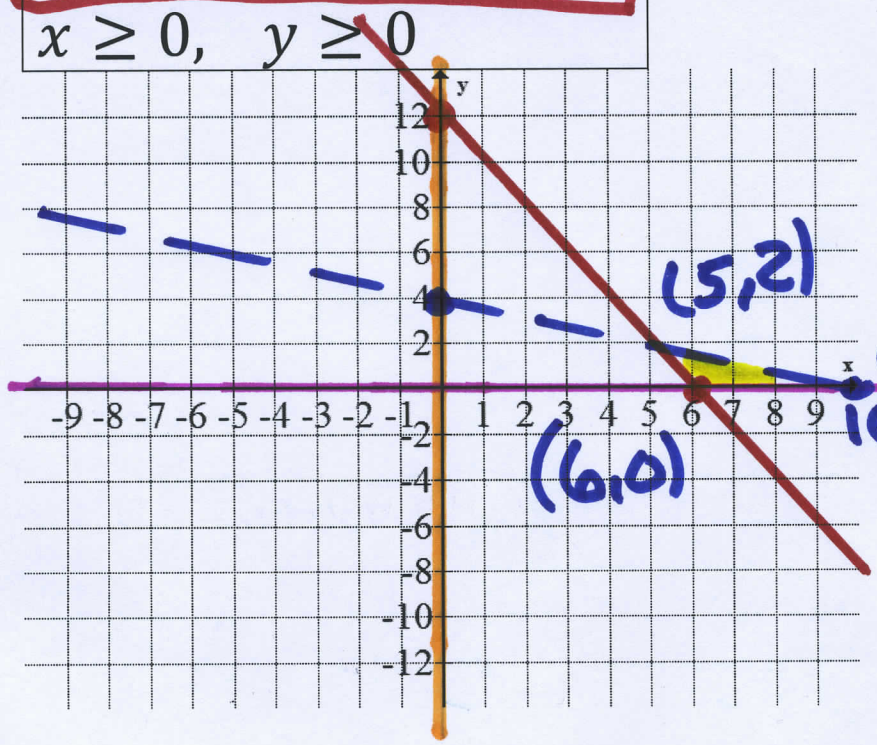
Shade TOWARD (3, 0) Keep Shading in FIRST QUADRANT Because $x \geq 0$, $y \geq 0$

37) I will do 37

$2x + 5y < 20$ Blue

$2x + y \geq 12$ Red

$x \geq 0, \quad y \geq 0$



$X \geq 0$
Solid line
y-AXIS
Shade Right

$y \geq 0$
Solid line
X-AXIS
Shade up

USE RREF(A)

$$\begin{bmatrix} 2 & 5 & 20 \\ 2 & 1 & 12 \end{bmatrix}$$

TO FIND INTERSECTION POINT OF (5, 2)

37) $2x+5y<20$

Find x, y intercepts of $2x+5y=20$

Draw Dashed line

x	y
0	4
10	0

$2(0)+5y=20$

$5y=20$

$y=4$

$2x+5(0)=20$

$2x=20$

$x=10$

Shading 1st

(9,0)

$2(9)+5(0)<20$

$18<20$

TRUE

(11,0)

$2(11)+5(0)<20$

$22<20$

FALSE

Shade towards (9,0)

Keep Shading In 1st Quadrant

Because $x \geq 0$, $y \geq 0$

37) $2x+y \geq 12$

Find x, y Intercepts $2x+y=12$

Draw Solid line

x	y
0	12
6	0

$2(0)+y=12$

$y=12$

$2x+0=12$

$2x=12$

$x=6$

Shading Rst

(5,0)

$2(5)+0 \geq 12$

$10 \geq 12$

FALSE

(7,0)

$2(7)+0 \geq 12$

$14 \geq 12$

TRUE

Shade towards (7,0)

Keep Shading in 1st Quadrant

Because $x \geq 0$, $y \geq 0$

$X \geq 0$

Solid line y-axis

Shade Right

$y \geq 0$

Solid line X-axis

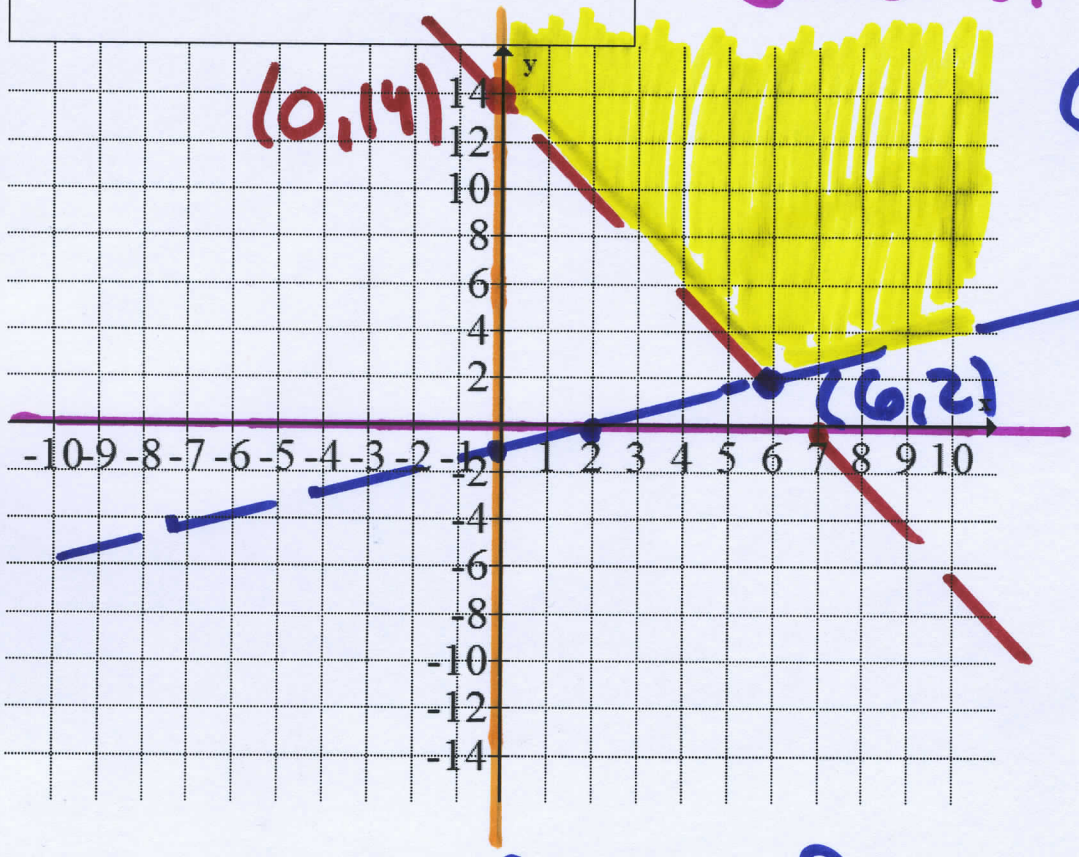
Shade up

39)

$x - 2y < 2$ Blue

$2x + y > 14$

$x \geq 0, \quad y \geq 0$



CORNER POINTS

(6, 2)

(0, 14)

USE RREF[A] $\begin{bmatrix} 1 & -2 & 2 \\ 2 & 1 & 14 \end{bmatrix}$

TO FIND POINT OF INTERSECTION

(6 , 2)

39) $x - 2y < 2$

Find x, y intercepts $x - 2y = 2$

Draw dashed line

x	y
0	-1
2	0

$0 - 2y = 2$

$-2y = 2$

$y = -1$

$x - 2(0) = 2$

$x = 2$

Shading test

(1, 0)

$1 - 2(0) < 2$

$1 < 2$

TRUE

(3, 0)

$3 - 2(0) < 2$

$3 < 2$

FALSE

Shade towards (1, 0) Keep shading in 1st quadrant

Because $x \geq 0$, $y \geq 0$

39) $2x+y>14$

Find x, y intercept $2x+y=14$

Draw dashed line

0	14
7	0

$2(0)+y=14$

$y=14$

$2x+0=14$

$2x=14$

$x=7$

Shading Test

(6,0)

$2(6)+0>14$

$12>14$

FALSE

(8,0)

$2(8)+0>14$

$16>14$

TRUE

Shade toward (8,0)

Keep shading in 1st quadrant

Because $x\geq 0$, $y\geq 0$