4/23/14 11.2 #15

$3x-7=3$ OR $3x-7=-3$

Write this pair of equations as an equivalent absolute value equation

$$|3x-7|=3$$

11.3 Absolute Value Inequalities

$$|2x+7| \leq 8$$

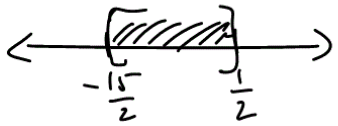
$$-8 \leq 2x+7 \leq 8$$

$$-7 \quad -7 \quad -7$$

$$-15 \leq 2x \leq 1$$

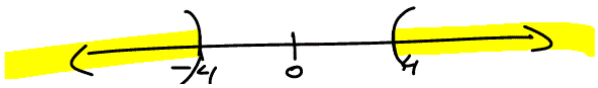
$$\frac{-15}{2} \leq \frac{2x}{2} \leq \frac{1}{2}$$

$$-\frac{15}{2} \leq x \leq \frac{1}{2}$$



$$\left[-\frac{15}{2}, \frac{1}{2}\right]$$

Solve: $|x| > 4$



$x < -4$ OR $x > 4$

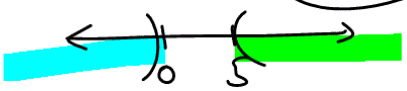
$|2x-5| > 5$

$2x-5 < -5$ OR $2x-5 > 5$

$+5 \quad +5 \qquad +5 \quad +5$

$\frac{2x}{2} < \frac{0}{2} \qquad \frac{2x}{2} > \frac{10}{2}$

$x < 0$ OR $x > 5$



$(-\infty, 0) \cup (5, \infty)$

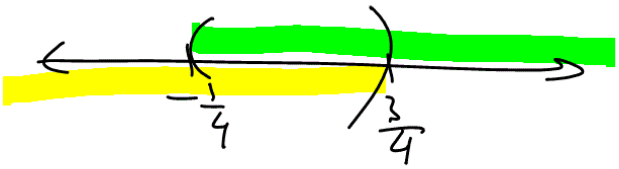
Solve $|4x-1| > -2$

$4x-1 > -2$ or $4x-1 < 2$

$+1 \quad +1 \qquad +1 \quad +1$

$\frac{4x}{4} > \frac{-1}{4} \qquad \frac{4x}{4} < \frac{3}{4}$

$x > -\frac{1}{4}$ OR $x < \frac{3}{4}$



$(-\infty, \infty)$

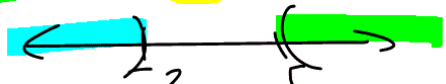
(1X) solve: $|2x-3| > 7$

$2x-3 > 7$ OR $2x-3 < -7$

$+3 \quad +3 \qquad +3 \quad +3$

$\frac{2x}{2} > \frac{10}{2} \qquad \frac{2x}{2} < \frac{-4}{2}$

$x > 5$ OR $x < -2$



$(-\infty, -2) \cup (5, \infty)$

(2X) solve: $|9+4x| \leq 2$

$-2 \leq 9+4x \leq 2$

$-9 \quad -9 \quad -9$

$\frac{-11}{4} \leq \frac{4x}{4} \leq \frac{-7}{4}$

$-\frac{11}{4} \leq x \leq -\frac{7}{4}$

$\left[-\frac{11}{4}, -\frac{7}{4}\right]$

Solve: $2 + 3\left|\frac{2}{3}x - 1\right| \geq 3$

$-2 \qquad\qquad -2$

① 'isolate abs. value'

$3\left|\frac{2}{3}x - 1\right| \geq 1$

$3 \qquad\qquad 3$

$\left|\frac{2}{3}x - 1\right| \geq \frac{1}{3}$

$3\left(\frac{2}{3}x - 1\right) \geq \frac{1}{3} \cdot 3$ OR $3\left[\frac{2}{3}x - 1\right] \leq -\frac{1}{3} \cdot 3$

$2x - 3 \geq 1$ (+3, +3)

$2x \geq 4$ (÷2, ÷2)

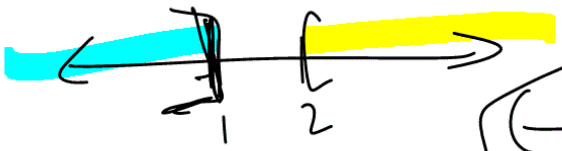
$x \geq 2$

OR

$2x - 3 \leq -1$ (+3, +3)

$2x \leq 2$ (÷2, ÷2)

$x \leq 1$



$(-\infty, 1] \cup [2, \infty)$

11.4 Graphing Linear Inequalities in two Variables and Systems of Linear Inequalities

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$2x - 4y \leq 1$

Graph.

① Graph line $2x - 4y = 1$

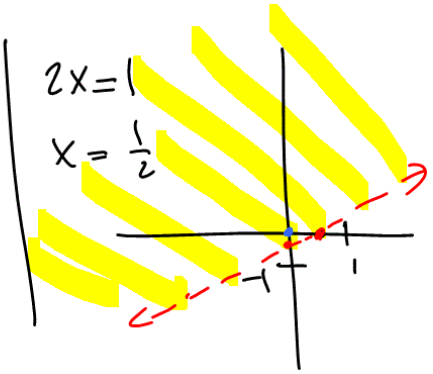
x	y
0	$-\frac{1}{4} = -0.25$
$\frac{1}{2}$	0

$-4y = 1$

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

$2x = 1$

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



② Shade: Test a point not on the line

test (0,0), x=0, y=0

$2x - 4y < 1$

$0 - 0 < 1$

$0 < 1$ (True)

Graph: $y \geq 3x$

Graph solid line $y = 3x$

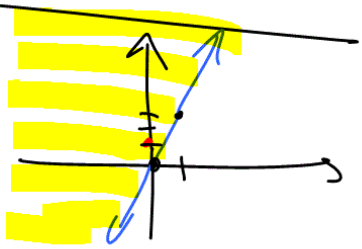
x	y
0	0
1	3

Test x=0, y=1

$1 \geq 3(0)$

$1 \geq 0$

True



Graph: #51

$$\begin{cases} y < 3x - 4 & ① \\ y \leq x + 2 & ② \end{cases}$$

$y < 3x - 4$

dashed line

x	y
0	-4
1	-1

shade

Test x=0, y=0

$0 < 3(0) - 4$

$0 < -4$ False

$y \leq x + 2$ solid line

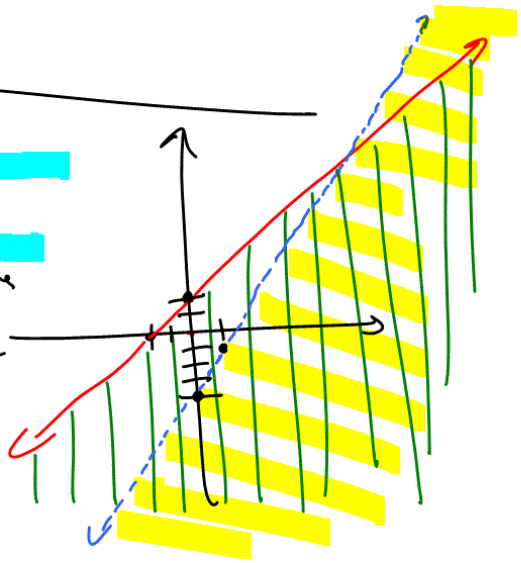
x	y
0	2
-2	0

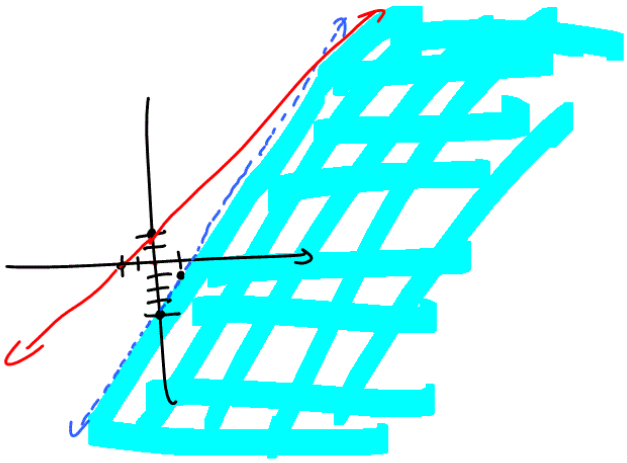
$0 = x + 2$

$-2 = x$

$0 \leq 0 + 2$

$0 \leq 2$





61 Graph:

$$\begin{cases} 3x - 4y \geq -6 \\ 2x + y \leq 7 \end{cases}$$

$3x - 4y \geq -6$

$3x - 4y = -6$ solid

x	y
-2	0
2	3

$3x = -6$

$x = -\frac{6}{3} = -2$

$6 - 4y = -6$

$-6 \quad -6$

$-4y = -12$

$y = \frac{-12}{-4} = 3$

Test (0,0): $0 \geq -6$ True

$2x + y \leq 7$

$2x + y = 7$

x	y
0	7
3	1

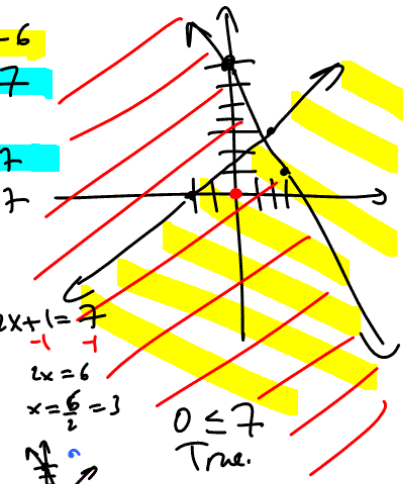
$2x + 1 = 7$

$-1 \quad -1$

$2x = 6$

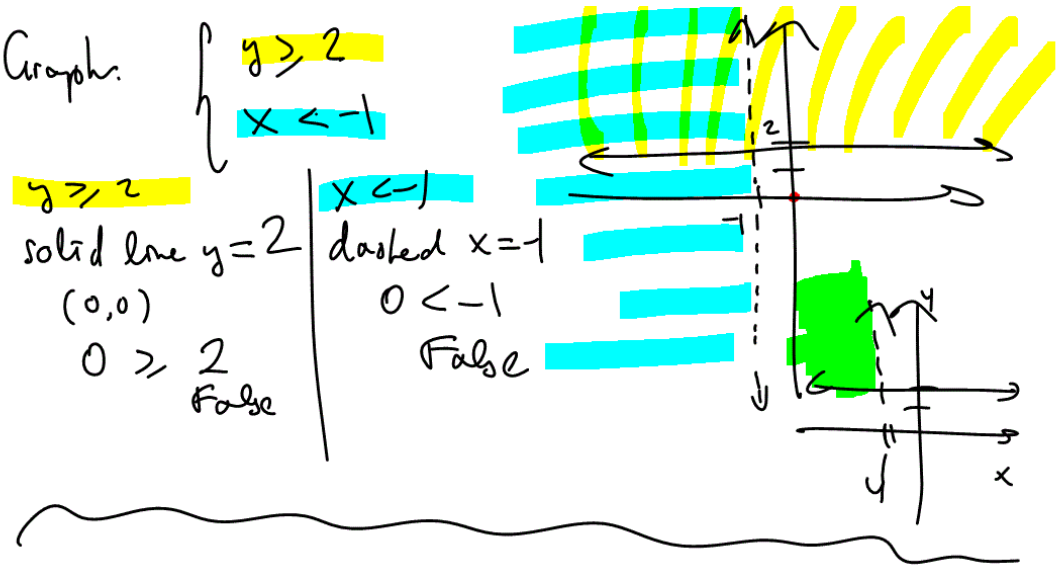
$x = \frac{6}{2} = 3$

$0 \leq 7$ True.



$$\begin{cases} 3x - 4y \geq -6 \\ 2x + y \leq 7 \end{cases}$$ Answer:

Graph: $\begin{cases} y \geq 2 \\ x < -1 \end{cases}$



$y \geq 2$

solid line $y = 2$

$(0,0)$

$0 \geq 2$

False

$x < -1$

dashed $x = -1$

$0 < -1$

False

(72) Graph: $\begin{cases} y \geq -\frac{3}{2}x + 3 & (1) \\ y < -\frac{3}{2}x + 6 & (2) \end{cases}$

(1)

x	y
0	3
2	0

$y = -\frac{3}{2} \cdot 2 + 3 = 0$

$0 \geq 0$

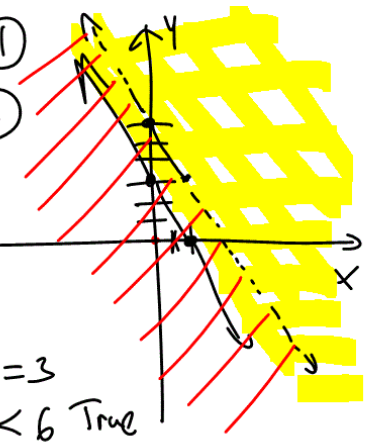
$0 \geq 3$ False

(2)

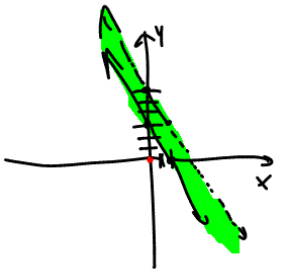
x	y
0	6
2	3

$-\frac{3}{2} \cdot 2 + 6 = 3$

$0 < 6$ True

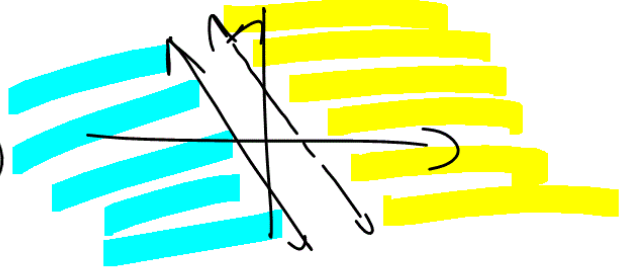


Answer :



What if -

No solution



12.1 The Algebra of Functions; Composite Functions

$f(x)$ and $g(x)$

$$(f+g)(x) = f(x) + g(x)$$
$$(f-g)(x) = f(x) - g(x)$$
$$(f \cdot g)(x) = f(x) \cdot g(x)$$
$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

#3 $f(x) = x^2+1$, $g(x) = 5x$

Find. (a) $(f-g)(x) = f(x) - g(x)$
$x^2+1 - 5x$

(b) $(f \cdot g)(x) = f(x) \cdot g(x) =$
$(x^2+1)\cdot(5x) =$
$5x^3 + 5x$

(c) $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{x^2+1}{5x}$

Composite Functions

$f(x)$ and $g(x)$

$$(f \circ g)(x) = f(g(x))$$

"Composition of $f(x)$ and $g(x)$"

(2X) $f(x) = 3x+2$, $g(x) = x^2+3x$

Find $(f \circ g)(x) = f(g(x)) =$

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

$(g \circ f)(x) = g(f(x)) = (3x+2)^2 + 3(3x+2)$

$9x^2 + 12x + 4 + 9x + 6$

$9x^2 + 21x + 10$

Ex $f(x) = x-3, \quad g(x) = x^2 + 2x + 1$

$(g \circ f)(x) = g(f(x))$

$(x-3)^2 + 2(x-3) + 1$

$x^2 - 6x + 9 + 2x - 6 + 1$

$x^2 - 4x + 4$
