

Systems of Inequalities

Thursday, January 9, 2020 3:14 PM

Are ^①(0, -2), ^②(3, -4), ^③(-3, -2)

Solutions to:

a) $2x - 3y \leq 6$

b) $3y > 2x - 6$

① (0, -2)

① (0, -2)

$2(0) - 3(-2) \leq 6$ ✓

$3(-2) > 2(0) - 6$

$0 + 6 \leq 6$
 ↑ less or Equal

$-6 > -6$ NO

② (3, -4)

②

$2(3) - 3(-4) \leq 6$

$3(-4) > 2(3) - 6$

$6 + 12 \leq 6$ x NO

$-12 > 6 - 6$

$-12 > 0$ NO

③ (-3, -2)

③

$2(-3) - 3(-2) \leq 6$

$3(-2) > 2(-3) - 6$

$-6 + 6 \leq 6$ ✓ yes
 $0 \leq 6$ ↓

$-6 > -6 - 6$

$-6 > -12$ yes



Graphs of Inequalities

a) $2x - 3y \leq 6$

Isolate for y

$$\begin{aligned} & \stackrel{-2x}{-2x} \quad \stackrel{-2x}{-2x} \\ \div (-3) \quad & -3y \leq 6 - 2x \quad \div (-3) \\ & \swarrow \text{reversed because we divided by neg.} \quad \searrow \text{or multiplied} \\ & y \geq -2 + \frac{2}{3}x \end{aligned}$$

Aside: Inequalities are just like equations

EXCEPT multiplying/dividing by a negative flips the inequality.

e.g. $4 > 2$

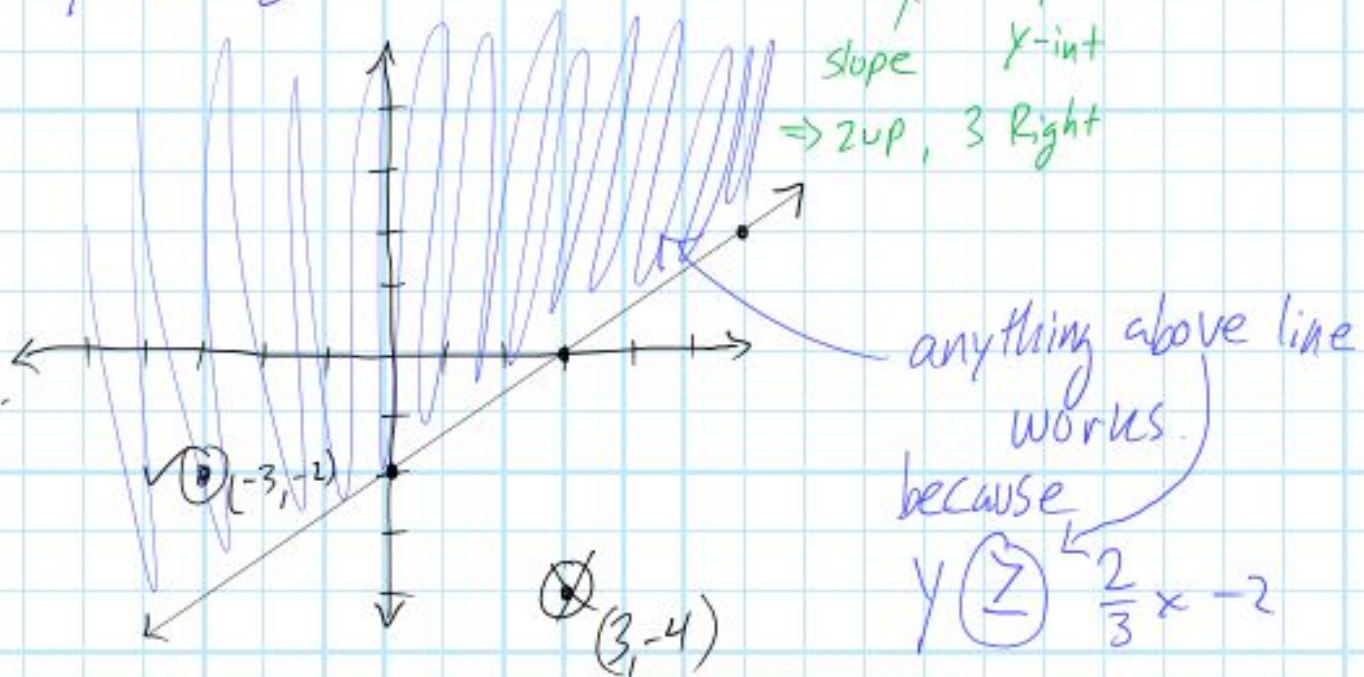
$+1 \quad 5 > 3 \quad +1$

$\cdot 2 \quad 10 > 6 \quad \cdot 2$

$\div -2 \quad 5 < -3 \quad \div -2$
 $\swarrow \text{not true}$

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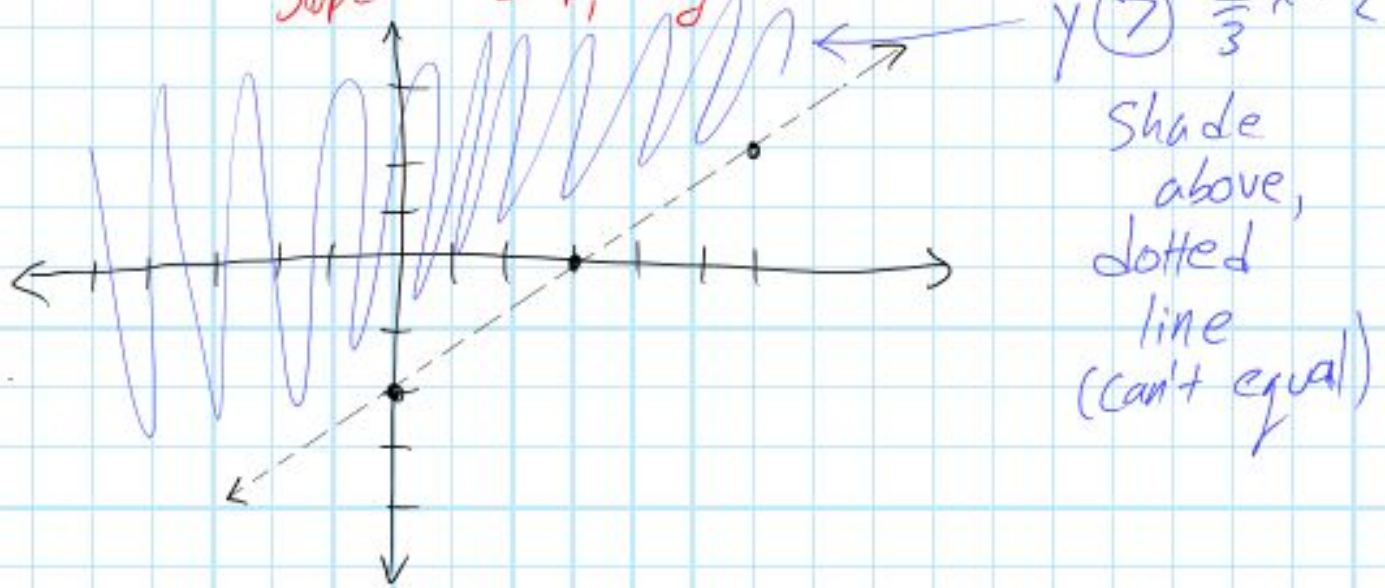
$$y \geq \frac{2}{3}x - 2 \Rightarrow \text{Graph } y = \frac{2}{3}x - 2$$



$$b) 3y > 2x - 6 \div 3$$

$$\div 3 \quad y > \frac{2}{3}x - 2 \leftarrow \begin{matrix} \text{y int} \\ -2 \end{matrix}$$

Slope \Rightarrow 2 up, 3 right



As a rule:

$y > f(x) \rightarrow$ Shade above, dotted line

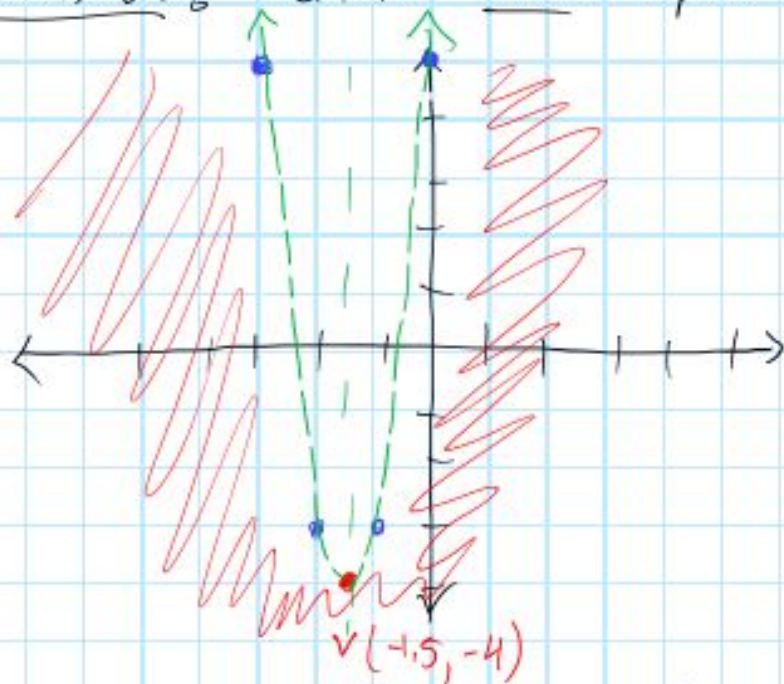
$y < f(x) \rightarrow$ Shade below, dotted line

$y \geq f(x) \rightarrow$ Shade above, solid line

$y \leq f(x) \rightarrow$ Shade below, solid line

Ex 2 $y < 4x^2 + 12x + 5$
 \hat{L} dotted, below

Parabolas: vertex and 2 pts on either side



Vertex:

$$h = \frac{-b}{2a}$$

$$= \frac{-12}{2(4)} = \frac{-12}{8}$$

$$= -\frac{3}{2} = -1.5$$

$$k = 4(-1.5)^2 + 12(-1.5) + 5$$
$$= -4$$

$$x = -1 \Rightarrow y = 4(-1)^2 + 12(-1) + 5$$
$$= 4 - 12 + 5 = -3$$

$$x = 0 \Rightarrow y = 4(0)^2 + 12(0) + 5 = 5$$

Ex 3 ① $y < 2x - 4$

below
Solid

Slope
→ 2 up, 1 right

y-int

System of inequalities

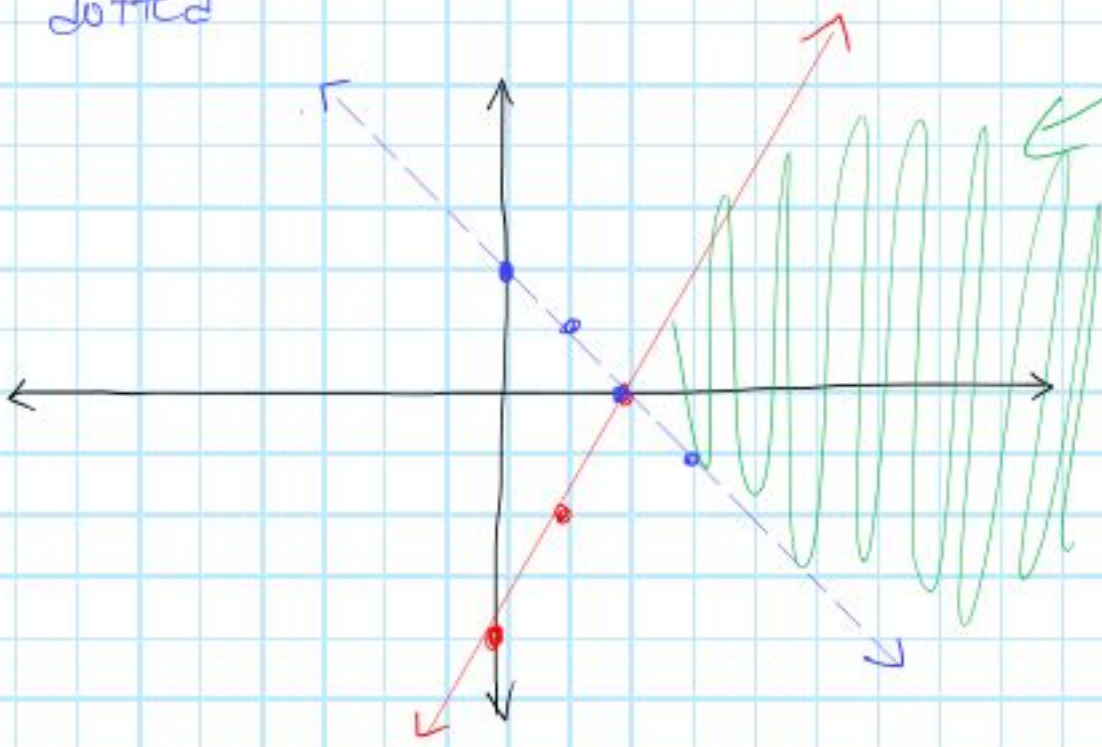
⇒ Both are true

② $y > 2 - x$

above
dotted

y-int

slope ⇒ 1 down, 1 right



overlap
(solution)