Systems of Inequalities

Thursday, January 9, 2020 3:14 PM

Are ① (0, -2), ② (3, -4), ③ (-3, -2)

Solutions to:

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

① (0, -2)

$2(0) - 3(-2) \leq 6$

$6 \leq 6$ ✓ yes

② (3, -4)

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

$6 + 12 \leq 6$

$18 \leq 6$ NO !!

③ (-3, -2)

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

$-6 + 6 \leq 6$ ✓ yes

$0 \leq 6$

b) $3y > 2x - 6$

① (0, -2)

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

$-6 > -6$ NO

② (3, -4)

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

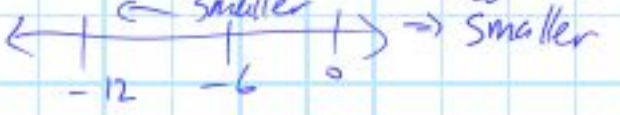
$-12 > 0$ no

③ (-3, -2)

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

$-6 > -12$

↖ Bigger (-)



# Graphing Inequalites

a) $2x - 3y \leq 6$ → Graph $2x - 3y = 6$ ⇒ line

$-2x \qquad -2x$

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

$\div(-3) \qquad \div(-3)$

$y \geq -2 + \frac{2}{3}x$

↑ because we mult/Div by a neg ⇒ flip

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Aside:

$4 > 2$

$+2 \qquad +2$

$6 > 4$

$-1 \quad 5 > 3 \quad -1$

$\cdot 2 \qquad \cdot 2$

$10 > 6$

$\cdot -2 \quad -20 \not> -12 \quad \cdot -2$

↑ wrong

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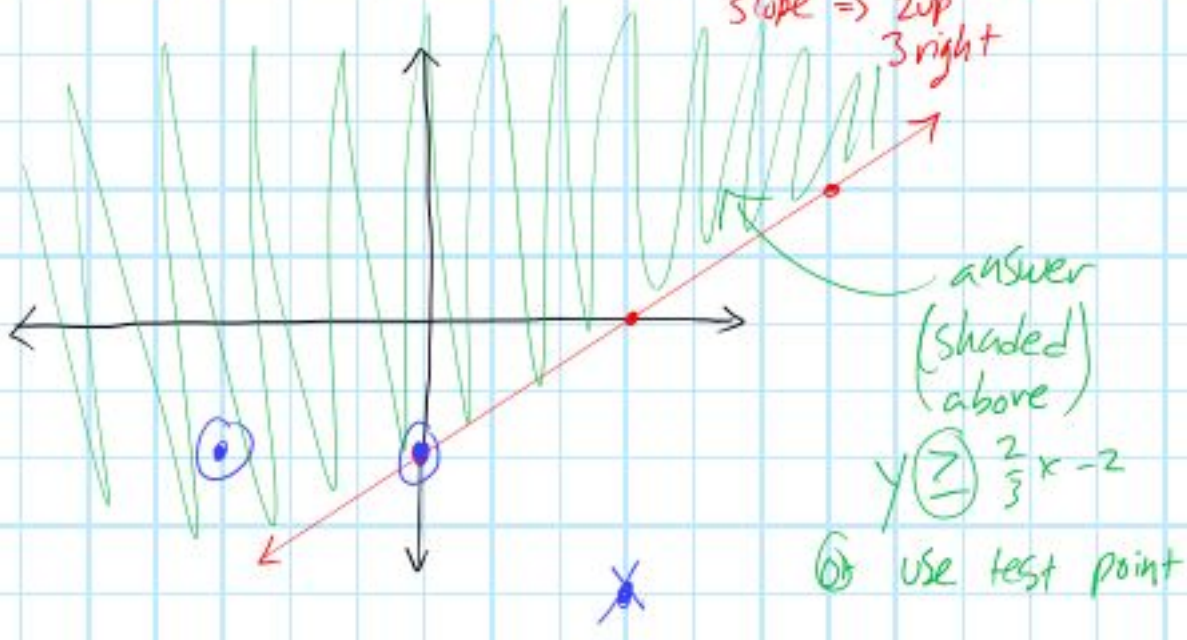
$y \geq \frac{2}{3}x - 2$ → Graph $y = \frac{2}{3}x - 2$ ↖ yint

↑ slope ⇒ 2up 3right




$y \geq \frac{2}{3}x - 2$

⑥ use test point

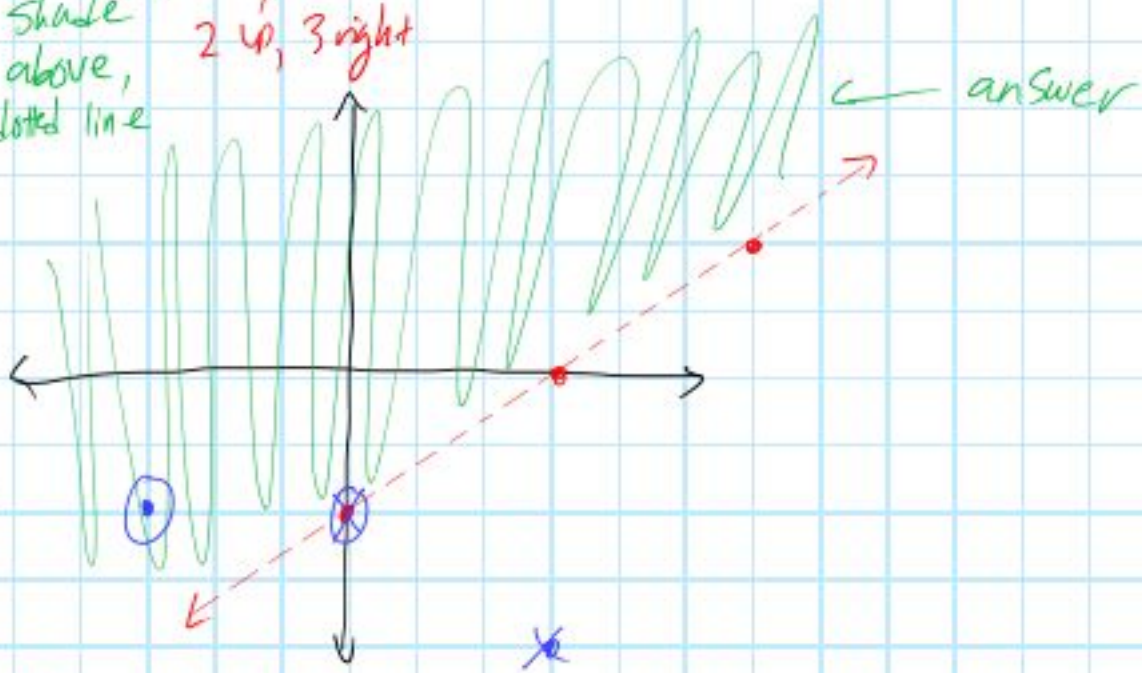
b) $3y > 2x - 6$

$\div 3$ $\div 3$

$y > \frac{2}{3}x - 2$ ← y-int

Shade above, dotted line

2 up, 3 right




As a rule:

$y > f(x)$ → dotted line, Shade above

$y < f(x)$ → dotted line, Shade below

$y \geq f(x)$ → Solid line, Shade above

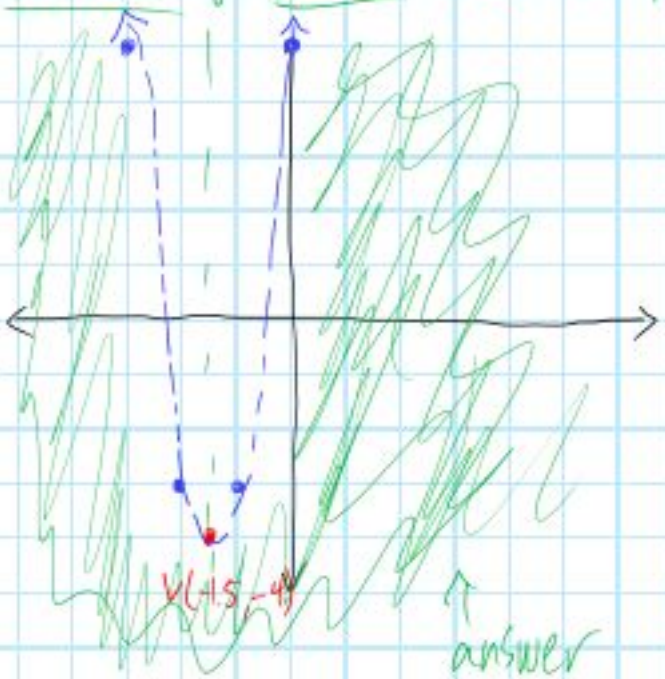
$y \leq f(x)$ → Solid line, Shade below

(when in doubt, use test point)

**Ex 2** Graph $y \leq 4x^2 + 12x + 5$

dotted, below

Parabola: vertex and 2 pts on either side




Vertex: $h = \frac{-b}{2a} = \frac{-12}{2(4)}$

$= \frac{-12}{8} = -\frac{3}{2} = -1.5$

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

$= -4$

Choose x values near vertex

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

$= 5$

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

$= 16 + (-24) + 5 = -3$

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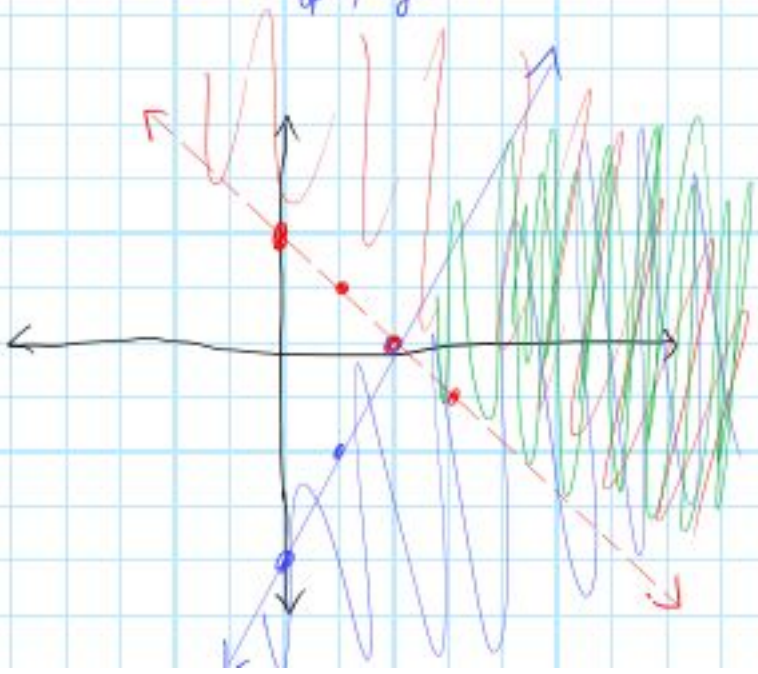
**Ex 3** ① $y \leq 2x - 4$

Solid below; Slope up 2, right 1; y int

② $y > 2 - x$

dotted above; y int; Slope $= -1$ $\Rightarrow$ 1 down, 1 right



← Solution (overlap)