

Pre-Calculus CP 1 – Section 7.5 Notes

Graphing all types of Systems of Inequalities

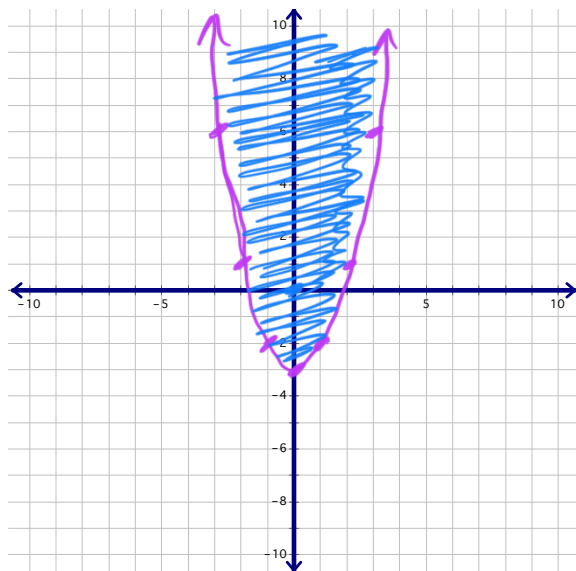
Name: KEY

Ex 1: Sketch the graph of $y \geq x^2 - 3$

You should know this one and be able to graph it using transformations!

$$y \geq x^2 - 3 \quad (0,0)$$

$$0 \geq 0^2 - 3 = -3 \quad \checkmark$$



Ex. 2: Sketch the graph of $x < y^2 + 1$

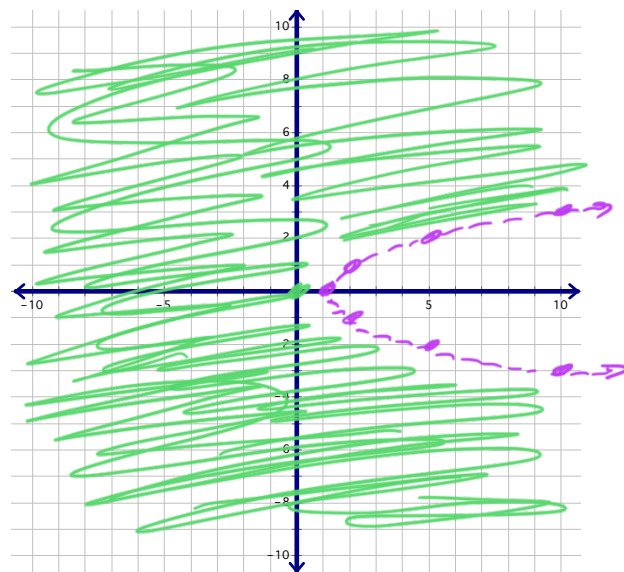
This is NOT a function – try graphing by plotting some points

$$y^2 > x - 1 \quad y = \sqrt{x}$$

$$y > \pm \sqrt{x - 1}$$

$$\checkmark (0,0) \quad 0 > \sqrt{0-1} = \sqrt{-1} \quad \text{DNE}$$

$$(5,0) \quad 0 > \sqrt{5-1} = \sqrt{4} = 2 \quad \text{NO}$$



Ex. 3: Sketch the graph of $x^2 + y^2 \leq 16$

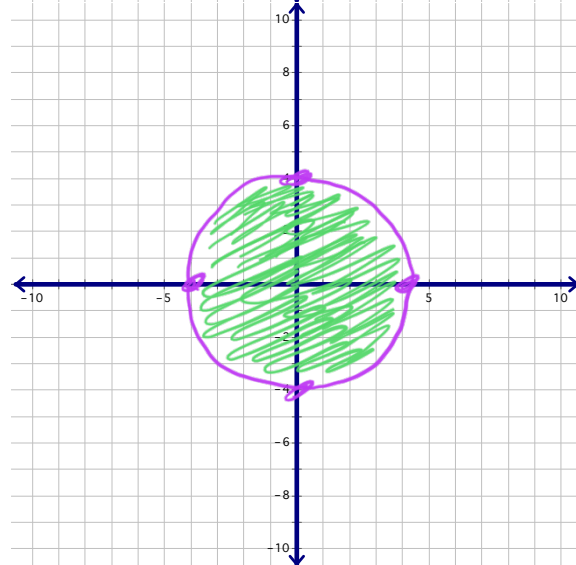
You should recognize this graph from earlier in the year....

$$x^2 + y^2 = 16 \quad \text{circle!}$$

$$(x-h)^2 + (y-k)^2 = r^2$$

$$(h,k) = (0,0) \quad r=4$$

$$(0,0) \Rightarrow 0^2 + 0^2 \leq 16 \quad \checkmark$$



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Now let's try doing MORE than one at once!

Ex. 4: Sketch the graph of the system- be sure to shade your final answer (feasible region) darker than the rest!

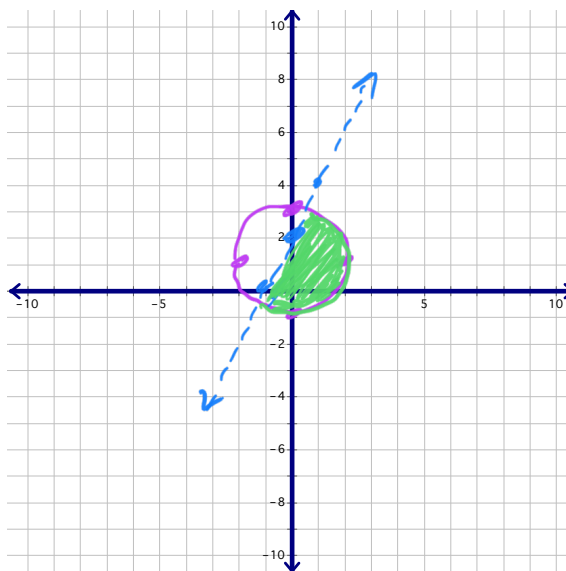
$$x^2 + (y-1)^2 \leq 4$$

$$2x - y > -2$$

$$y < 2x + 2$$

$$(0,0) \rightarrow 0 < 2(0) + 2 = 2$$

circle $(0,1), r=2$
 $0^2 + (-1)^2 \leq 4 \checkmark$



Ex. 5: Sketch the graph of the system- be sure to shade your final answer (feasible region) darker than the rest!

$$x^2 > y - 3$$

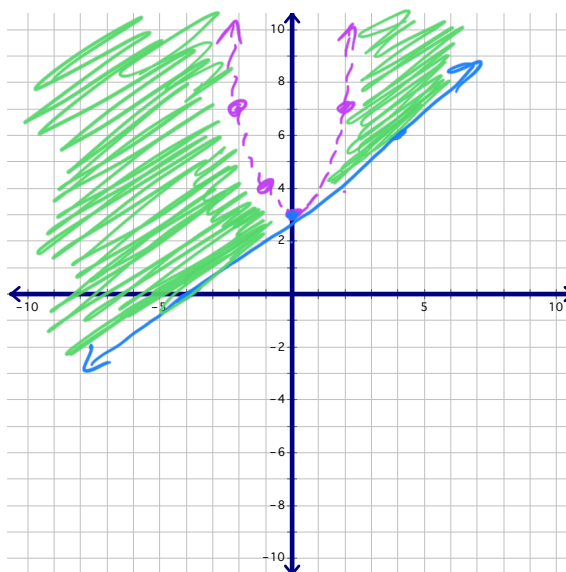
$$3x - 4y \leq -12$$

$$4y \geq 3x + 12$$

$$y \geq \frac{3x}{4} + 3$$

$(0,0) \Rightarrow 0 \geq 3 \times$

$\rightarrow y < x^2 + 3$
 $0 < +3 \quad (0,0) \checkmark$

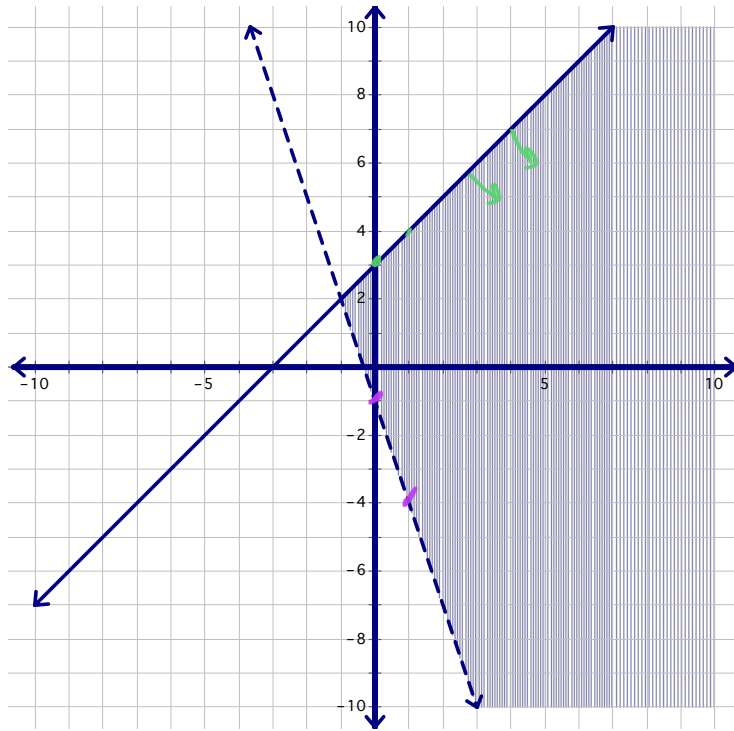


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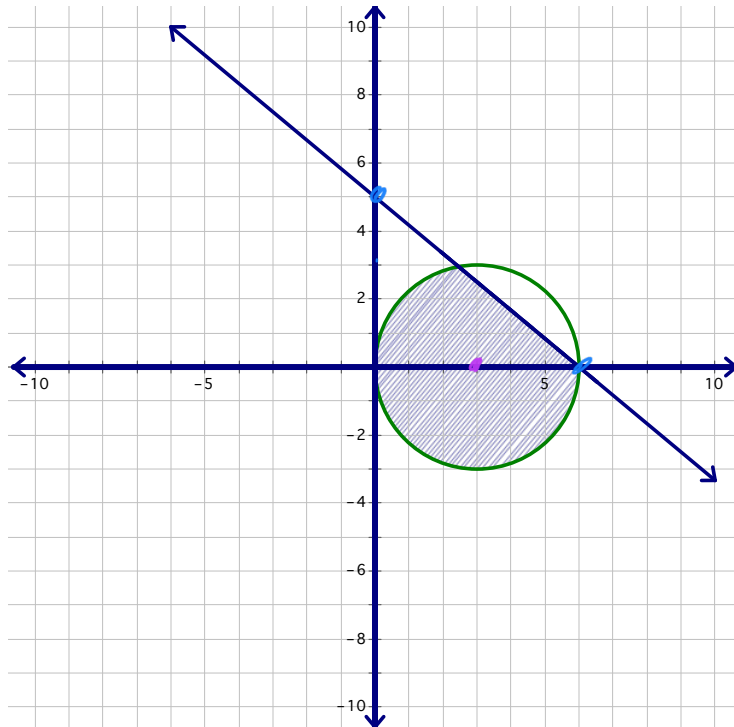
Let's try going the other way- WRITE the system of equations based on the graph below:

Ex. 6:



$$\begin{aligned} y &\leq x + 3 & 0 &\leq 3 \\ y &> -3x - 1 & 0 &> -1 \end{aligned}$$

Ex. 7:



$$\begin{aligned} (x - 3)^2 + y^2 &\leq 9 \\ (3, 0) &\rightarrow 0 < 9 \end{aligned}$$

$$\begin{aligned} y &\leq -\frac{5x}{6} + 5 \\ (0, 0) &\rightarrow 0 \leq 5 \end{aligned}$$

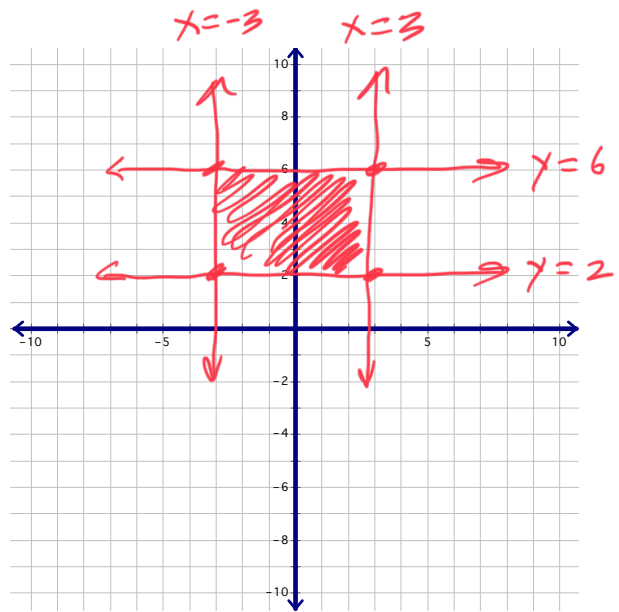
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For the following, use the set of vertices given to graph the feasible region and derive a set of inequalities that would give you that region:

Ex. 8: A rectangle with vertices $(-3,2)$, $(-3,6)$, $(3,6)$, $(3,2)$

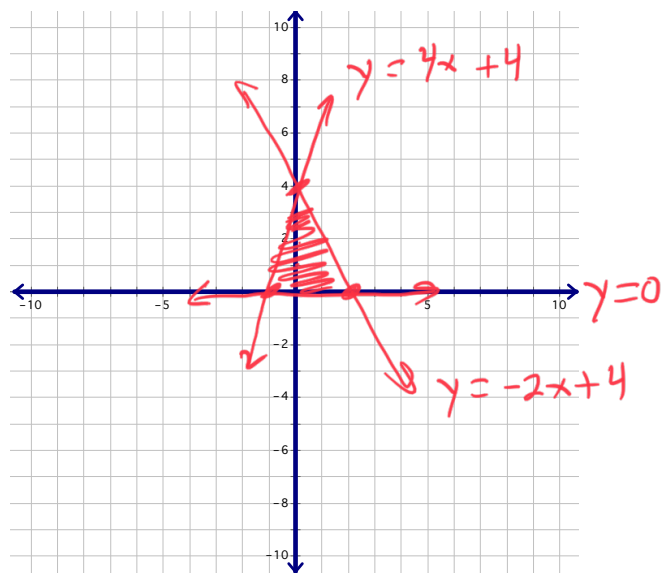
$$\begin{aligned} x &\geq -3 \\ x &\leq 3 \\ y &\leq 6 \\ y &\geq 2 \end{aligned}$$



Ex. 9: A triangle with vertices $(-1,0)$, $(2,0)$, $(0,4)$

$$\begin{aligned} y &\geq 0 \\ y &\leq 4x + 4 \\ y &\leq -2x + 4 \end{aligned}$$

$(0,0)$
 $0 < 4$
 $(0,0)$
 $0 < -2(0) + 4$



Homework: p. 548 #2, 11, 43, 46, 57, 58, 59, 62, 63, 72