

SYSTEMS OF INEQUALITIES

- OBJECTIVES:** 1) Graph a system of inequalities and find the feasible region.
2) Determine if a point is a solution to a given inequality.

IS IT A SOLUTION?

1) Determine if the following points are solution to the inequality $2x - 3y < 12$.

a) $(3,1)$ solution

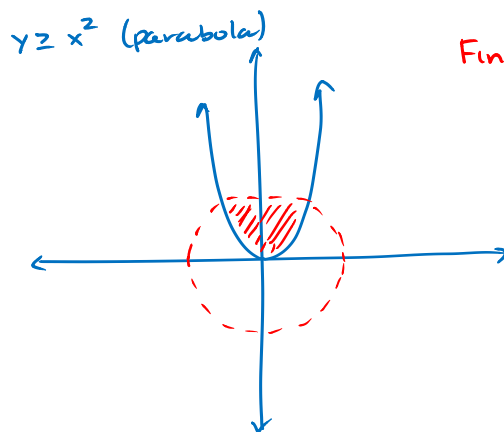
$$\begin{aligned} 2(3) - 3(1) &< 12 \\ 6 - 3 &< 12 \\ 3 &< 12 \quad \checkmark \end{aligned}$$

b) $(6,0)$ not a solution

$$\begin{aligned} 2(6) - 3(0) &< 12 \\ 12 &< 12 \\ \text{False} \end{aligned}$$

GRAPHING SYSTEMS OF INEQUALITIES

2) $\begin{cases} y - x^2 \geq 0 \\ x^2 + y^2 < 1 \end{cases}$



Find intersections: solve the system!

$$\begin{cases} y = x^2 \\ x^2 + y^2 = 1 \end{cases}$$

$$y + y^2 = 1$$

$$y^2 + y - 1 = 0$$

$$y = \frac{-1 \pm \sqrt{1 - 4(-1)}}{2}$$

$$y = \frac{-1 \pm \sqrt{5}}{2}$$

~~$$\frac{-1 + \sqrt{5}}{2}$$~~

If $y = \frac{-1 + \sqrt{5}}{2}$

$$y = x^2$$

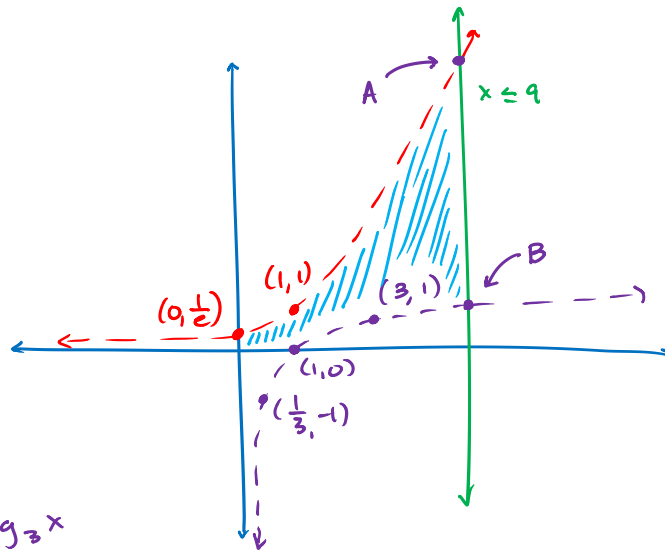
$$x = \pm \sqrt{y}$$

$$x = \pm \sqrt{\frac{-1 + \sqrt{5}}{2}}$$

$$\left(\sqrt{\frac{-1 + \sqrt{5}}{2}}, \frac{-1 + \sqrt{5}}{2} \right)$$

$$\left(-\sqrt{\frac{-1 + \sqrt{5}}{2}}, \frac{-1 + \sqrt{5}}{2} \right)$$

$$3) \begin{cases} y \geq 0 \\ y < e^{x-1} \\ y > \log_3 x \\ x \geq 0 \\ x \leq 9 \end{cases}$$



Point A:

$$\begin{cases} x=9 \\ y=e^{x-1} \end{cases}$$

$A(9, e^8)$

Point B:

$$\begin{cases} x=9 \\ y=\log_3 x \end{cases}$$

$B(9, 2)$