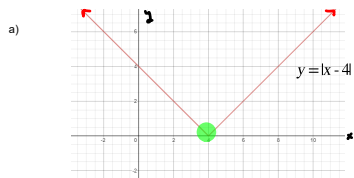


**Sample Problems**

Write the piecewise function that represent each graph.

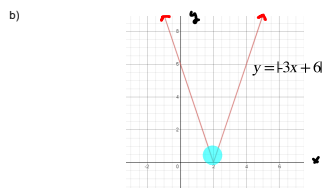


$$f(x) = \begin{cases} x - 4, & \text{if } x - 4 \geq 0 \\ -(x - 4), & \text{if } x - 4 < 0 \end{cases}$$

Final answer:

$$f(x) = \begin{cases} x - 4, & \text{if } x \geq 4 \\ -(x - 4), & \text{if } x < 4 \end{cases}$$

**Note:** The domain of the function,  $(-\infty, \infty)$  has been divided into two parts,  $x \geq 4$  and  $x < 4$ . (As well, 4 is the x-coordinate of the x-intercept.)



Solve the inequalities.

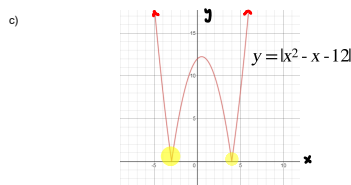
$$f(x) = \begin{cases} -3x + 6, & \text{if } -3x + 6 \geq 0 \\ -(-3x + 6), & \text{if } -3x + 6 < 0 \end{cases}$$

$$\begin{array}{ll} -3x + 6 \geq 0 & -3x + 6 < 0 \\ 6 \geq 3x & 6 < 3x \\ 2 \geq x & 2 < x \end{array}$$

Final answer:

$$f(x) = \begin{cases} -3x + 6, & \text{if } x \leq 2 \\ -(-3x + 6), & \text{if } x > 2 \end{cases}$$

**Note:** The domain of the function,  $(-\infty, \infty)$  has been divided into two parts,  $x \leq 2$  and  $x > 2$ .

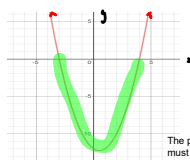


Solve the inequality.

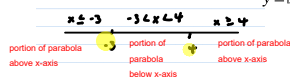
$$f(x) = \begin{cases} x^2 - x - 12, & \text{if } x^2 - x - 12 \geq 0 \\ -(x^2 - x - 12), & \text{if } x^2 - x - 12 < 0 \end{cases}$$

To solve a quadratic inequality, solve the corresponding quadratic equation.

$$\begin{aligned} x^2 - x - 12 &= 0 \\ (x - 4)(x + 3) &= 0 \\ x &= 4, x = -3 \end{aligned}$$



The points between  $x = -3$  and  $x = 4$  must be reflected to get the graph of  $y = |x^2 - x - 12|$ .



$$f(x) = \begin{cases} x^2 - x - 12, & \text{if } x \leq -3 \text{ or } x \geq 4 \\ -(x^2 - x - 12), & \text{if } -3 < x < 4 \end{cases}$$

reflected portion of the graph