# PIECEWISE FUNCTIONS

A function that is defined using two or more equations for different intervals of the domain.

1. **Evaluate given** $f(x) = \begin{cases} \sqrt{20+x}, & if \ -8 < x < -1 \\ 3x^2 - 2x, & if \ -1 \leq x \leq 16 \\ |5-2x|, & if \ x > 16 \end{cases}$

**a.** $f(16)$

$f(16) = 3x^2 - 2x$

$= 3(16)^2 - 2(16)$

736

**b.** $f(-2)$

$f(-2) = \sqrt{20+x}$

$\sqrt{20-2} = \sqrt{18}$

9 2

$3\sqrt{2}$

**c.** $f(28)$

$|5-2(28)|$

$|-51|$

51

# GRAPH

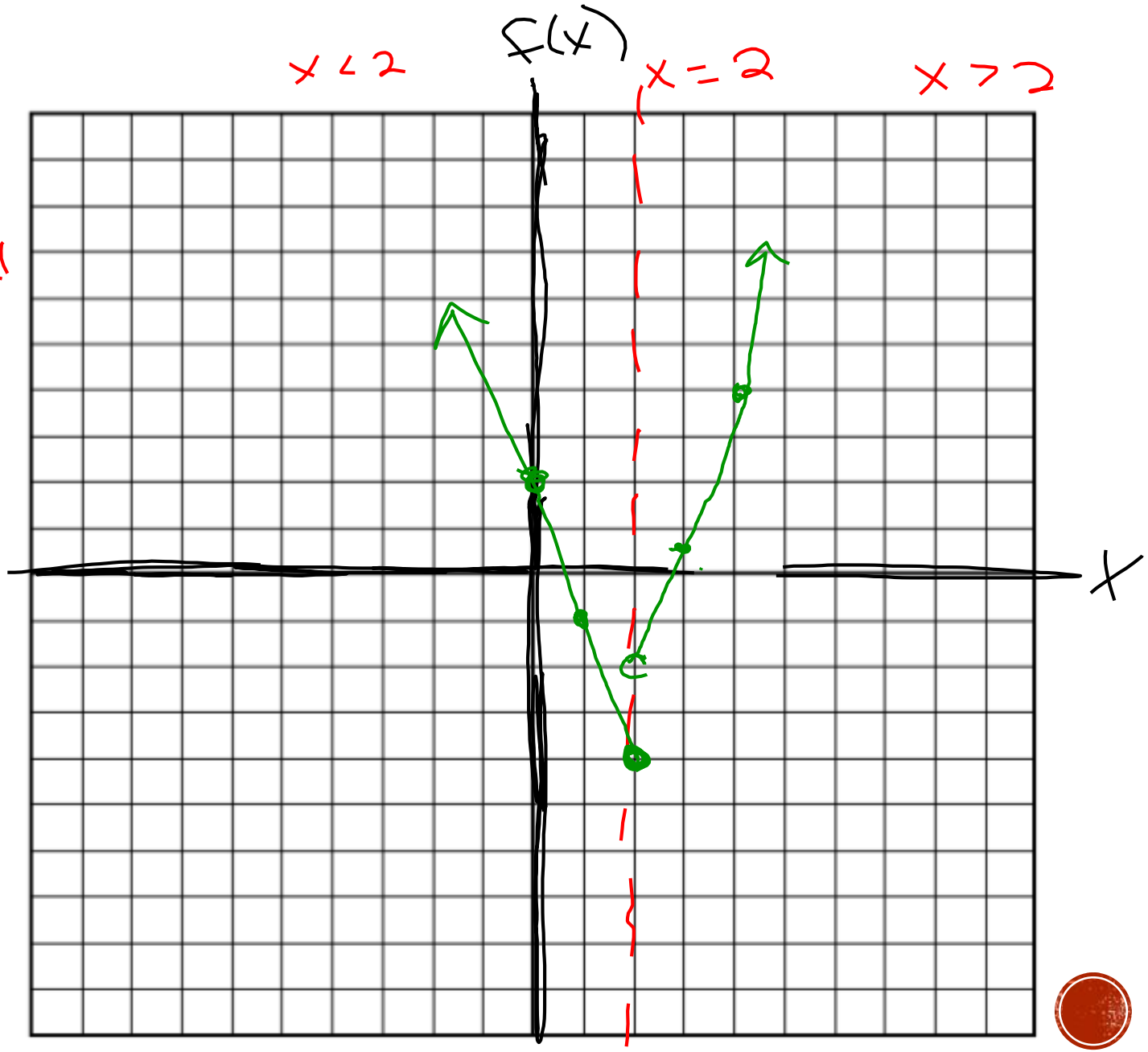
$y = -3x + 2$

| x | y |
|---|---|
| 2 | −4 |
| 1 | −1 |
| 0 | 2 |

$$2.\ f(x) = \begin{cases} -3x + 2, & x \leq 2 \\ \frac{1}{2}x^2 - 4, & x > 2 \end{cases}$$

critical pt.

| x | y |
|---|---|
| 2 | −2 |
| 3 | 1/2 |
| 4 | 4 |



# GRAPH

$y = |x + 1|$

| x | y |
|---|---|
| 0 | 1 |
| −1 | 0 |
| −2 | 1 |

$y = \sqrt{x+3}$

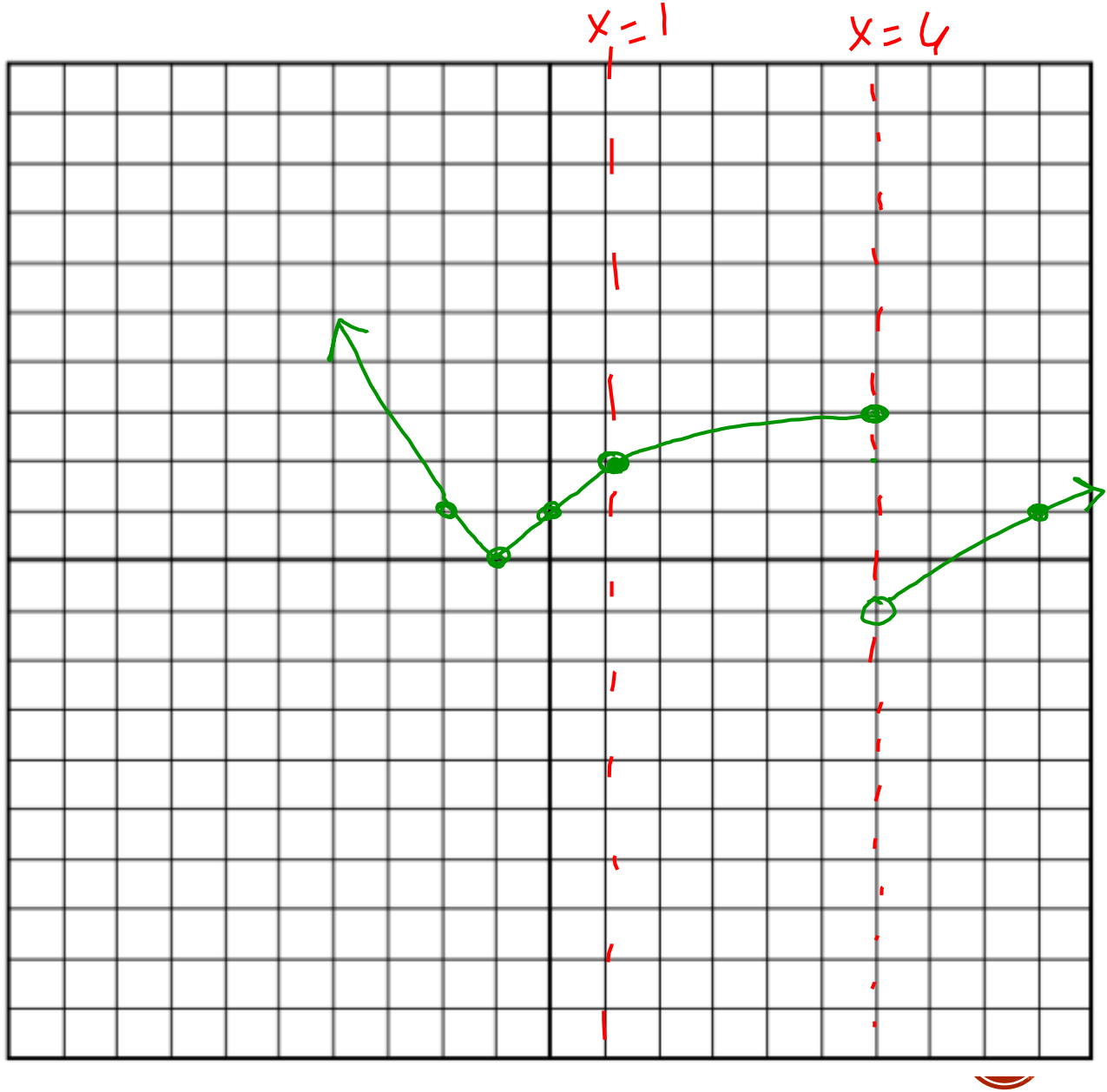
| x | y |
|---|---|
| −1 | 2 |
| −2 | $\sqrt{2}$ |
| −3 | $\sqrt{1}$ |
| −6 | 0 |

$$3.\ f(x) = \begin{cases} |x+1|, & if\ x < 1 \\ \sqrt{x+3}, & if\ 1 \le x \le 6 \\ \frac{2}{3}x - 5, & if\ x > 6 \end{cases}$$

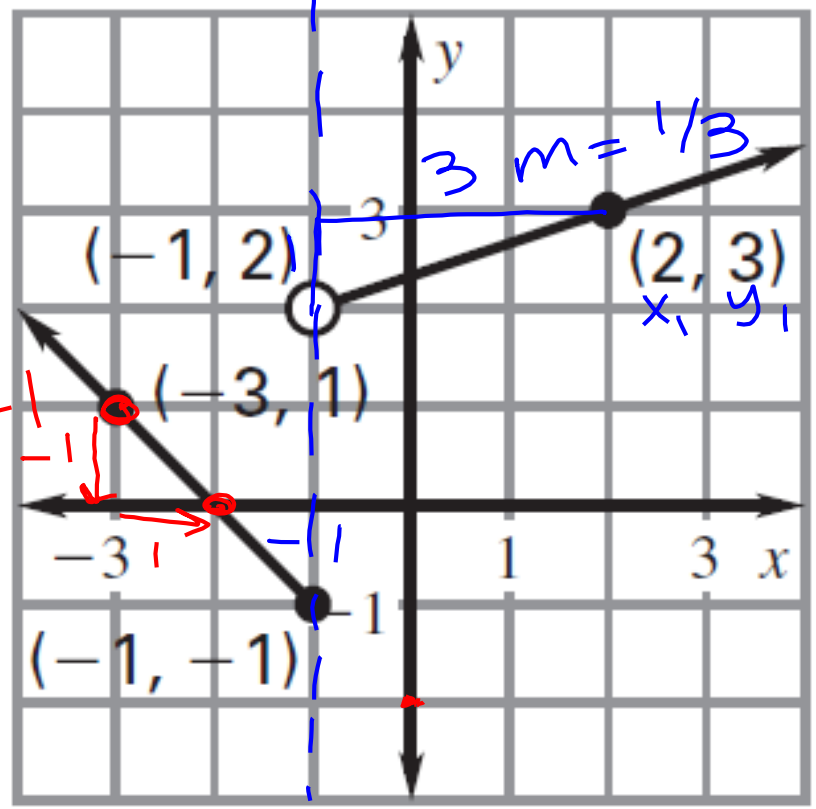
$\frac{2}{3} \cdot 6$

$y = 2/3x - 5$

| x | y |
|---|---|
| 6 | −1 |
| 9 | 1 |



**4.** Write the equation for the graph shown.




$m = 1/3$

$m = -1$

$b = -2$

$y + 1 = -1(x + 1)$

$y = -x - 1$

$y = -x - 2$

$y - 3 = \frac{1}{3}(x - 2)$

$y = \frac{1}{3}x - \frac{2}{3} + \frac{9}{3}$

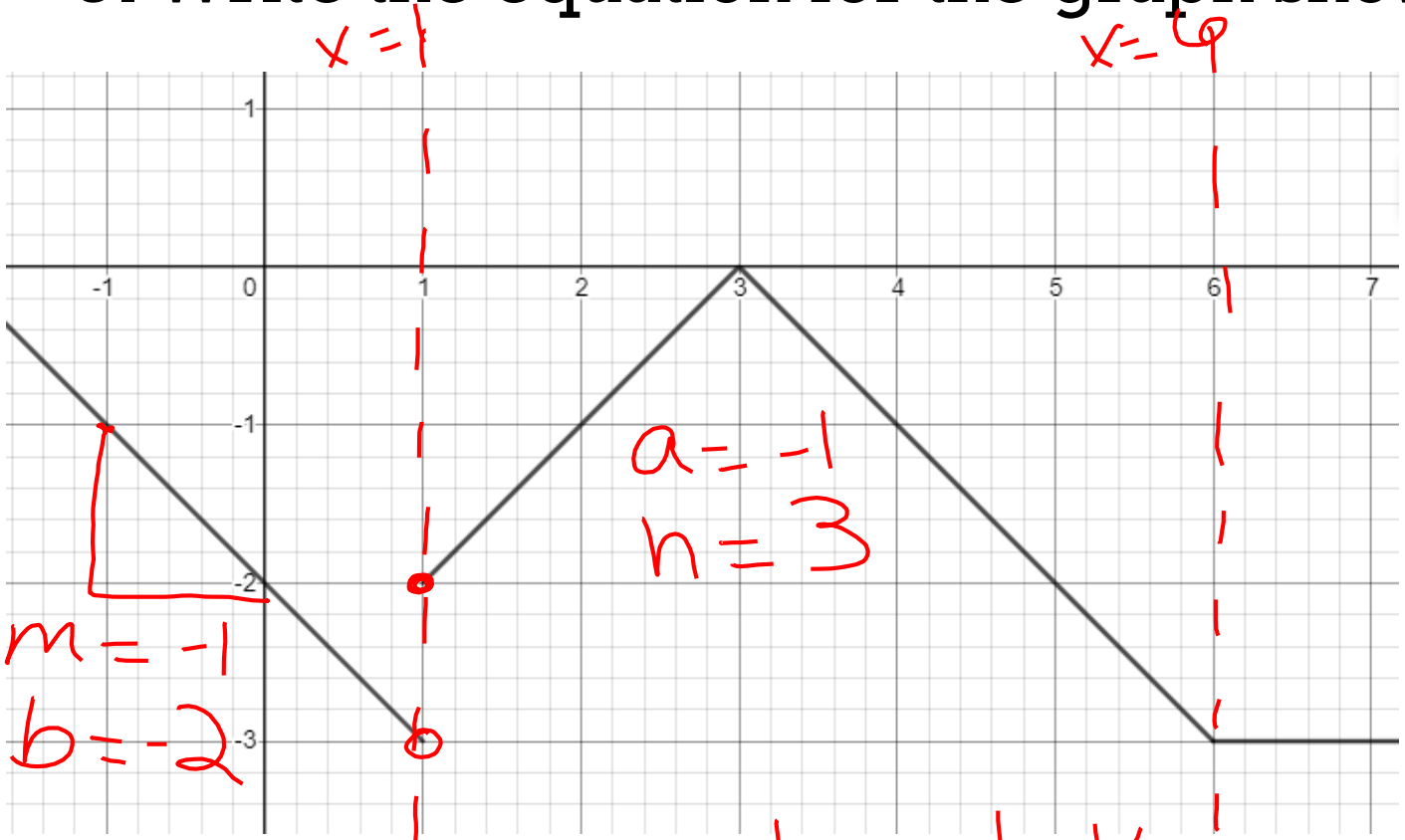
$y = \frac{1}{3}x + \frac{7}{3}$

Function

Domain

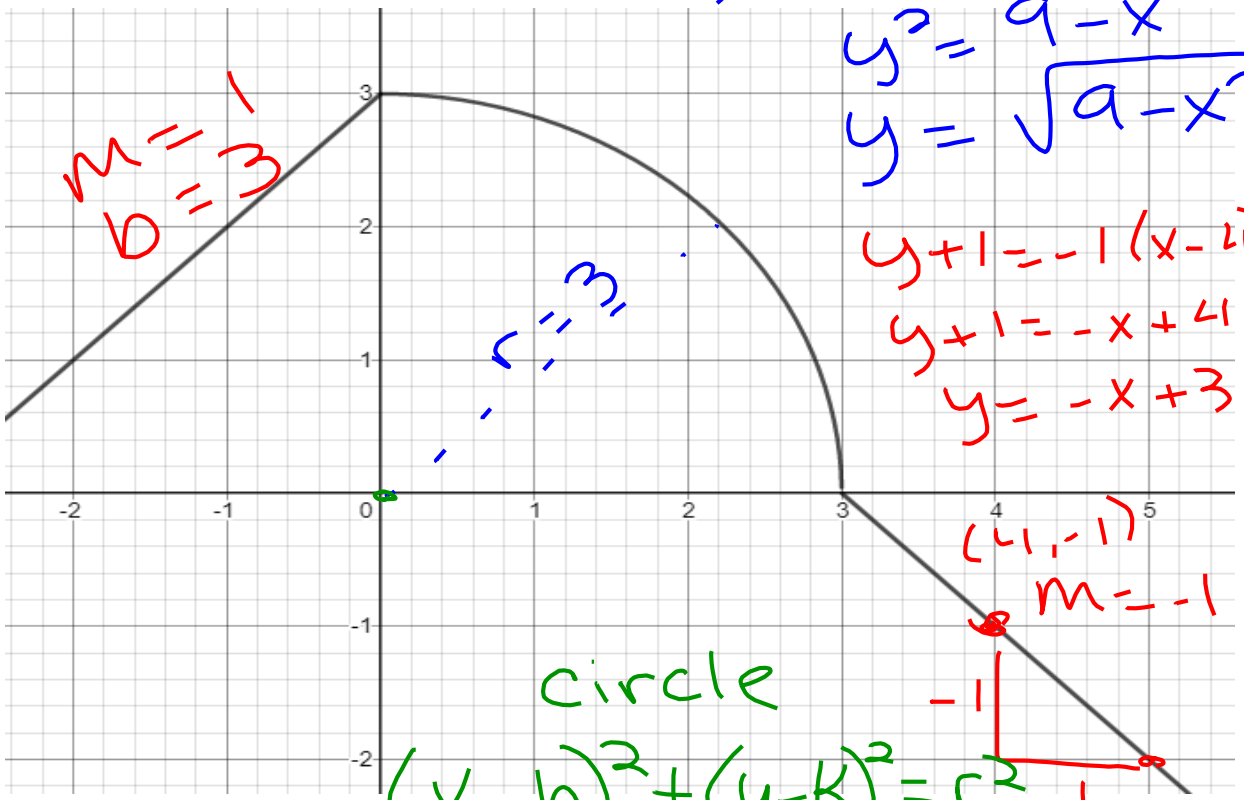
$$f(x) = \begin{cases} -x - 2, & x \le -1 \\ \frac{1}{3}x + \frac{7}{3}, & x > -1 \end{cases}$$

**5.** Write the equation for the graph shown.




$$f(x) = \begin{cases} -x - 2, & x < 1 \\ -|x-3|, & 1 \le x \le 6 \\ -3, & x > 6 \end{cases}$$

**6.** Write the equation for the graph shown.




$$f(x)=\begin{cases} x+3, & x\le 0 \\ \sqrt{9-x^2}, & 0\le x\le 3 \\ -x+3, & x\ge 3 \end{cases}$$