

3.3 Practice – Piecewise Functions

Name: _____

Pre-Calculus

Find the value of the given function at the indicated domain value.

$$g(x) = \begin{cases} -x^2 - 5x + 2, & x < 1 \\ x^3 - 5x, & 1 \leq x < 11 \\ -\sqrt{3x-16}, & x > 11 \end{cases}$$

$$h(x) = \begin{cases} 2x^2 - 2x + 1, & x \leq -6 \\ 3x - x^3, & -3 < x \leq 1 \\ 2x - |x - 10|, & x > 1 \end{cases}$$

1. $g(1) = (1)^3 - 5(1)$
 $= 1 - 5$
 $g(1) = -4$

2. $g(11) = \text{D.N.E.}$

3. $h(5) = 2(5)^2 - 2(5) + 1$
 $= 10 - |5 - 10|$
 $= 10 - 5$
 $h(5) = 5$

4. $h(-10) = 2(-10)^2 - 2(-10) + 1$
 $= 2(100) + 20 + 1$
 $= 200 + 21$
 $h(-10) = 221$

5. $g(-1) = -(-1)^2 - 5(-1) + 2$
 $= -(-1) + 5 + 2$
 $= -1 + 7$
 $g(-1) = 6$

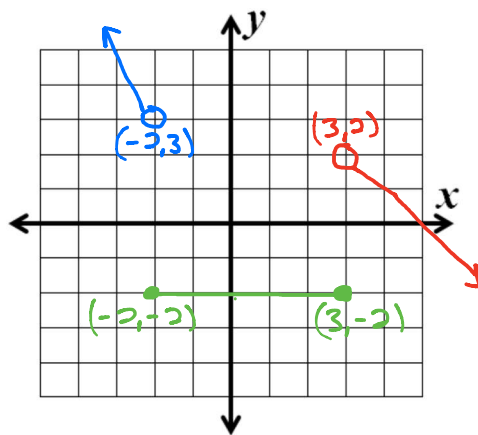
6. $h(0) = 3(0) - (0)^3$
 $= 0 - 0$
 $h(0) = 0$

7. $g(20) = -\sqrt{3(20)-16}$
 $= -\sqrt{60-16}$
 $= -\sqrt{44}$
 $g(20) = -2\sqrt{11}$

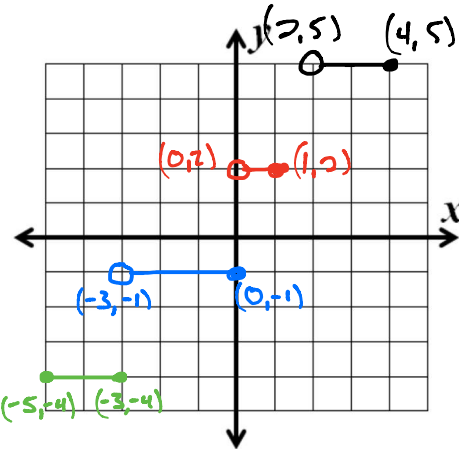
8. $h(-4) = \text{D.N.E.}$

Graph the following piecewise functions.

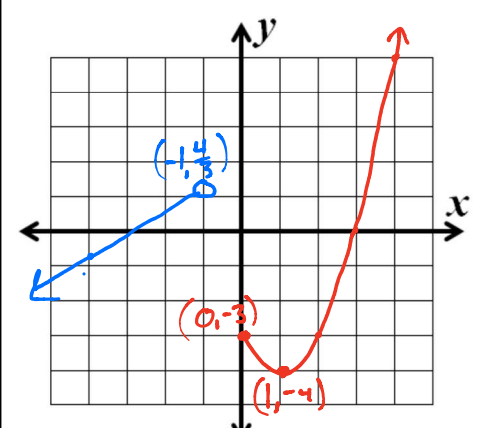
9. $f(x) = \begin{cases} -2x - 1, & x < -2 \\ -2, & -2 \leq x \leq 3 \\ -x + 5, & x > 3 \end{cases}$



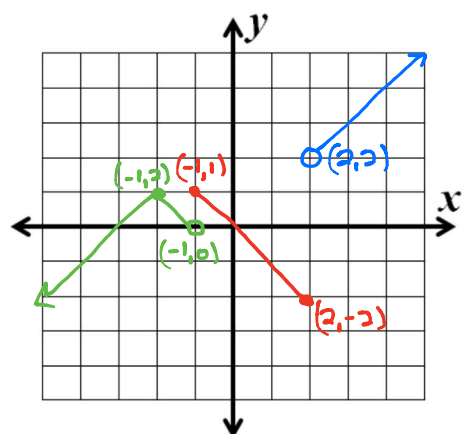
10. $f(x) = \begin{cases} -4, & -5 \leq x \leq -3 \\ -1, & -3 < x \leq 0 \\ 2, & 0 < x \leq 1 \\ 5, & 2 < x \leq 4 \end{cases}$



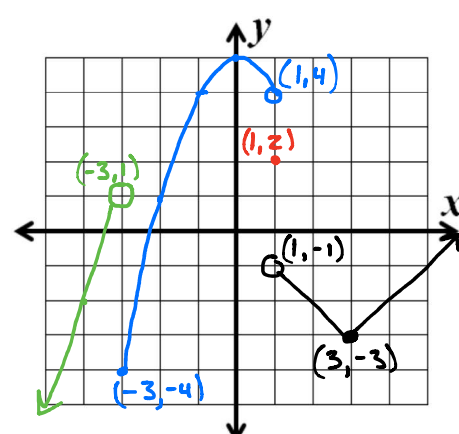
11. $h(x) = \begin{cases} \frac{2}{3}x + 2, & x < -1 \\ (x-1)^2 - 4, & x > 0 \end{cases}$



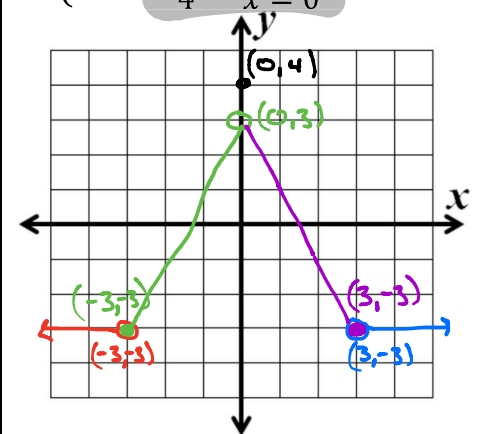
12. $f(x) = \begin{cases} -|x+2| + 1, & x < -1 \\ -x, & -1 \leq x \leq 2 \\ x, & x > 2 \end{cases}$



13. $h(x) = \begin{cases} 3x + 10, & x < -3 \\ -x^2 + 5, & -3 \leq x < 1 \\ 2, & x = 1 \\ |x-3| - 3, & x > 1 \end{cases}$



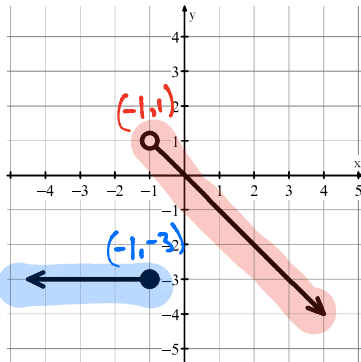
14. $g(x) = \begin{cases} -3, & x < -3 \\ 2x + 3, & -3 \leq x < 0 \\ -2x + 3, & 0 < x \leq 3 \\ -3, & x > 3 \\ 4, & x = 0 \end{cases}$



Given the graph of f , write out the function's equation. Use a linear expression ($mx + b$) for straight lines, absolute values if there is a "V" graph.

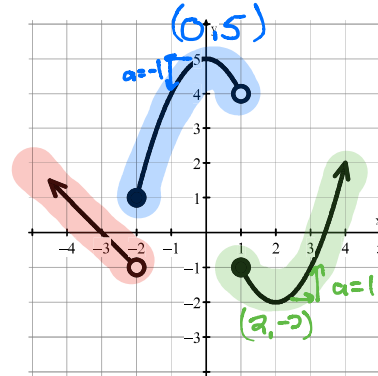
15.

$$f(x) = \begin{cases} -3, & x \leq -1 \\ -x, & x > -1 \end{cases}$$



16.

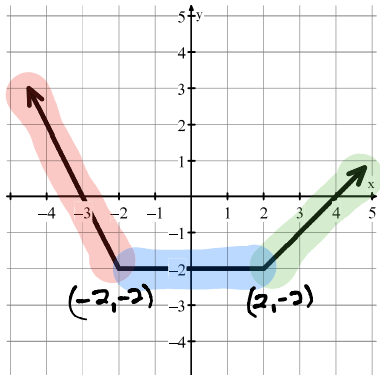
$$f(x) = \begin{cases} -x - 3, & x < -2 \\ -x^2 + 5, & -2 \leq x < 1 \\ (x-2)^2 - 2, & x \geq 1 \end{cases}$$



17.

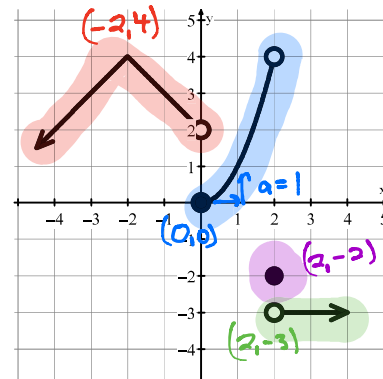
$$f(x) = \begin{cases} -2x - 6, & x < -2 \\ -2, & -2 \leq x \leq 2 \\ x - 4, & x > 2 \end{cases}$$

The "or equal to" can be in a different location.



18.

$$f(x) = \begin{cases} -|x+2| + 4, & x < 0 \\ x^2, & 0 \leq x < 2 \\ -2, & x = 2 \\ -3, & x > 2 \end{cases}$$



Tell if the function is continuous. Show any work that leads to your conclusion.

19. $h(x) = \begin{cases} x + 1, & x < 2 \\ 2x - 1, & x \geq 2 \end{cases}$

$$\begin{aligned} x + 1 &= 2x - 1 \\ @ x = 2: (2) + 1 &= 2(2) - 1 \\ 3 &= 4 - 1 \\ 3 &= 3 \end{aligned}$$

\therefore CONTINUOUS

20. $g(x) = \begin{cases} x + 3, & x < -1 \\ x^2 - x, & x > -1 \\ 3, & x = -1 \end{cases}$

$$\begin{aligned} x + 3 &= x^2 - x = 3 \\ @ x = -1: (-1) + 3 &= (-1)^2 - (-1) = 3 \\ 2 &= 1 + 1 = 3 \\ 2 &= 2 = 3 \end{aligned}$$

\therefore DISCONTINUOUS

21. $f(x) = \begin{cases} 4x^2 - 2x, & x < 3 \\ 10x, & x = 3 \\ 30, & x > 3 \end{cases}$

$$\begin{aligned} 4x^2 - 2x &= 10x = 30 \\ @ x = 3: 4(3)^2 - 2(3) &= 10(3) = 30 \\ 4(9) - 6 &= 30 = 30 \\ 36 - 6 &= 30 = 30 \\ 30 &= 30 = 30 \end{aligned}$$

\therefore CONTINUOUS

22. $f(x) = \begin{cases} 21 - 3x, & x < 5 \\ 2x - 4, & x > 5 \end{cases}$

$5 \notin$ Domain

\therefore DISCONTINUOUS