Continuity with Piecewise Functions Name Key

Graph the piecewise-defined function. Then determine the left and right limits at the indicated values. Also determine if the function is continuous at the indicated value(s). If not, state why.

1. $f(x) = \begin{cases} x^2 & , x \le 1 \\ x & , x > 1 \end{cases}$

Is f continuous at x = 1? yes

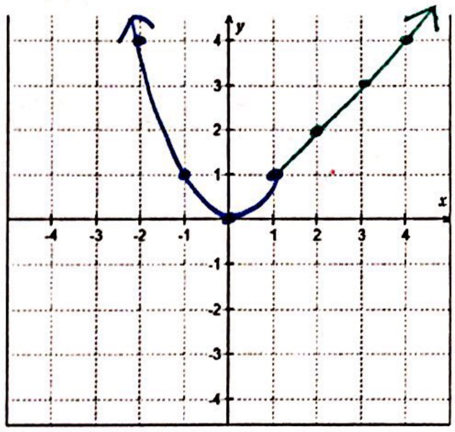
Why or why not?

$\lim_{x \to 1} f(x) = f(1)$

A) $\lim_{x \to 1^-} f(x) =$ 1

B) $\lim_{x \to 1^+} f(x) =$ 1

C) $\lim_{x \to 1} f(x) =$ 1



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

Is f continuous at $x = -1$? no

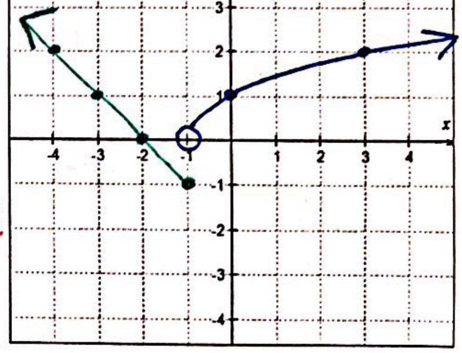
Why or why not?

$\lim_{x \to -1} f(x) \neq f(-1)$

A) $\lim_{x \to -1^-} f(x) =$ -1

B) $\lim_{x \to -1^+} f(x) =$ 0

C) $\lim_{x \to -1} f(x) =$ DNE



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3. $f(x) = \begin{cases} x^3 + 1 & , x \le 0 \\ e^x & , x > 0 \end{cases}$

Is f continuous at $x = 0$? yes

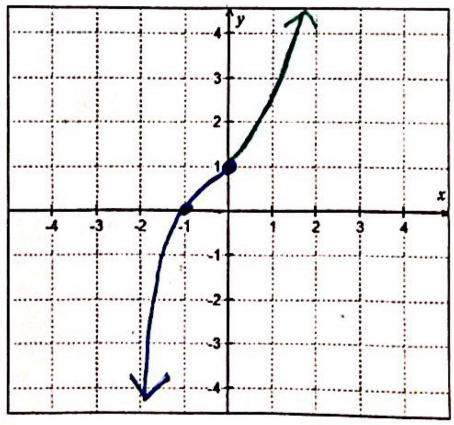
Why or why not?

$\lim_{x \to 0} f(x) = f(0)$

A) $\lim_{x \to 0^-} f(x) =$ 1

B) $\lim_{x \to 0^+} f(x) =$ 1

C) $\lim_{x \to 0} f(x) =$ 1



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

Is f continuous at $x = 1$?

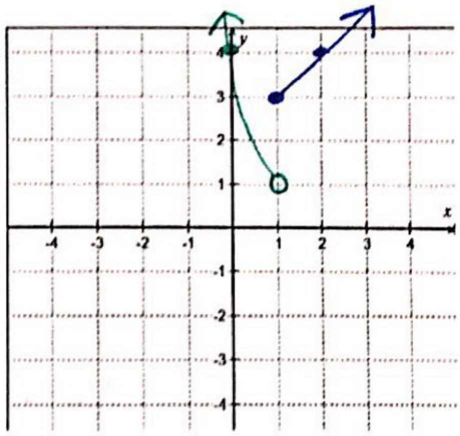
Why or why not? no

$\lim_{x \to 1} f(x) \neq f(1)$

A) $\lim_{x \to 1^-} f(x) =$ 1

B) $\lim_{x \to 1^+} f(x) =$ 3

C) $\lim_{x \to 1} f(x) =$ DNE



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5. $f(x) = \begin{cases} \sin x & ,x > \frac{\pi}{2} \\ 3 - x^2 & ,x \le \frac{\pi}{2} \end{cases}$

Is f continuous at $x = \frac{\pi}{2}$?

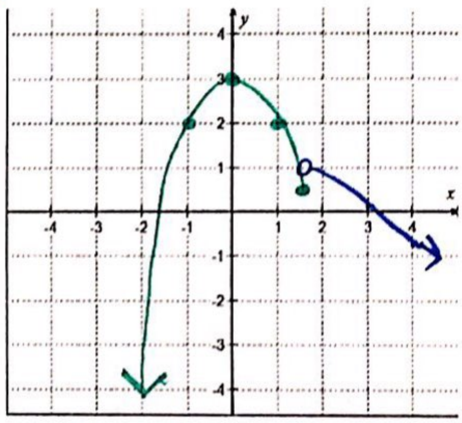
Why or why not? no

$\lim_{x \to \frac{\pi}{2}} f(x) \neq f(\pi/2)$

A) $\lim_{x \to \frac{\pi}{2}^-} f(x) =$ 0.53

B) $\lim_{x \to \frac{\pi}{2}^+} f(x) =$ 1

C) $\lim_{x \to \frac{\pi}{2}} f(x) =$ DNE



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6. $f(x) = \begin{cases} 3 - x^2, & x \le 1 \\ 2 & ,1 < x < 3 \\ 5 - x & ,x \ge 3 \end{cases}$

Is f continuous at $x = 1$?

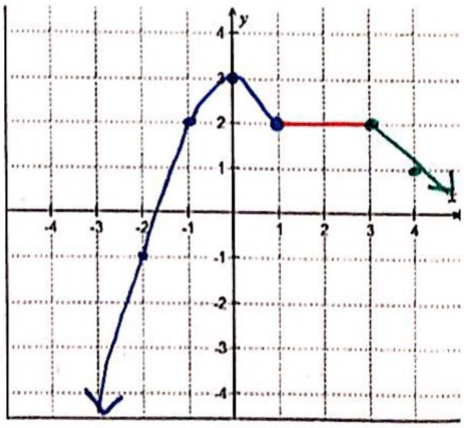
Why or why not? yes

$f(1) = \lim_{x \to 1} f(x)$

A) $\lim_{x \to 1^-} f(x) =$ 2

B) $\lim_{x \to 1^+} f(x) =$ 2

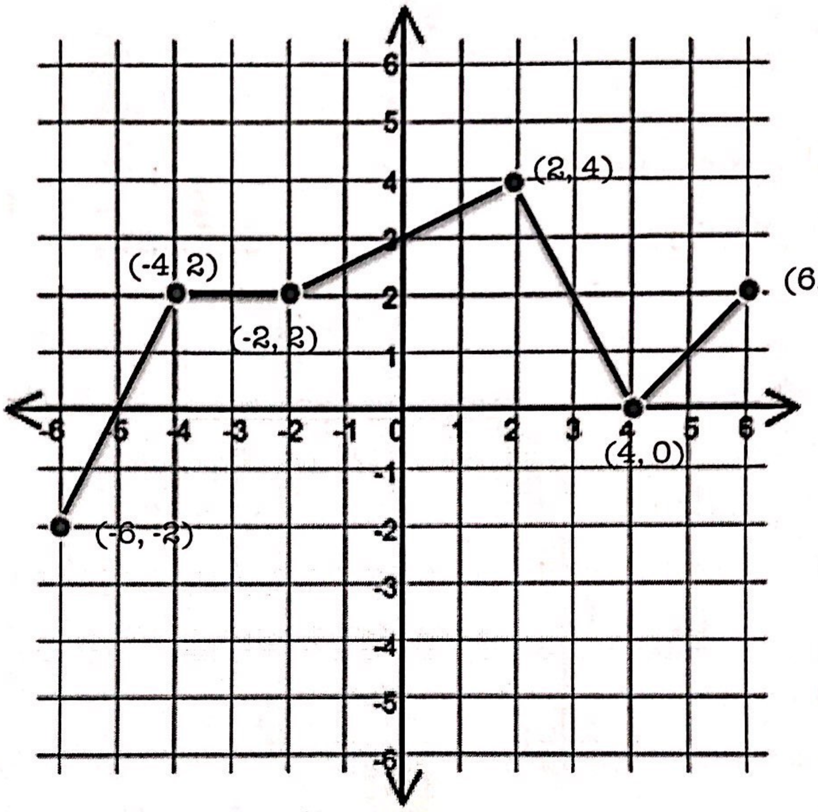
C) $\lim_{x \to 1} f(x) =$ 2



Key!

Analyzing a Graph
Worksheet #1

This is the graph of f(x). Answer the questions below the graph.



1. What is f(2)? 4	2. What is f(-5)? 0
3. Where does f(x) = 3? x = 0 & 2.5	4. At what x value does this function have its maximum value? 2
5. At what x value does this function have its minimum value? -6	6. Over what x values is this function increasing? (-6,-4)∪(-2,2)∪(4,6)
7. Over what x values is this function constant? [-4,-2]	8. Over what x values is this function positive? (-5,6)
9. Where does this function equal zero? x = -5 & 4	10. Over what x-values is this function negative? (-6,-5)

Rationals 4-Way Form A Names: Key !!

GIVEN:

$$f(x) = \frac{x^2 + 2x - 8}{x^2 - x - 2}$$

PERSON #1: Factor the function

$$\boxed{y = \frac{(x+4)(x-2)}{(x-2)(x+1)}}$$

PERSON #2: Check and initial: ____________

PERSON #2: Find the x-intercept

$$y = \frac{x+4}{x+1}$$

$\boxed{(-4,0)}$

$x+4=0$

$x=-4$

PERSON #3: Check and initial: ____________

PERSON #3: Find the y-intercept

$y = \frac{0+4}{0+1}$ $y=4$

$\boxed{(0,4)}$

PERSON #4: Check and initial: ____________

PERSON #4: Find the horizontal asymptote

EATS DC

$\frac{1}{1} = 1$ $\boxed{y=1}$

PERSON #1: Check and initial: ____________

PERSON #1: Find the vertical asymptote

$x+1=0$

$\boxed{x=-1}$

PERSON #3: Check and initial: ____________

Person #2: Find the coordinates of the hole.

$f(2) = \frac{2+4}{2+1} = \frac{6}{3} = 2$

$\boxed{(2,2)}$

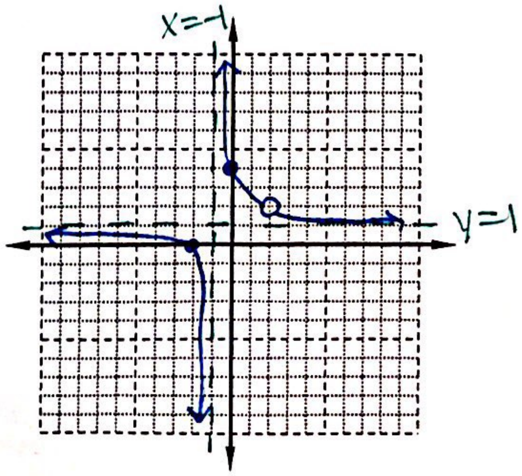
PERSON #4: Check and initial: ____________

PERSON #3: Graph the asymptotes.

PERSON #4: Graph the function.

PERSON #1: Label the x-intercept.

PERSON #2: Label the y-intercept.



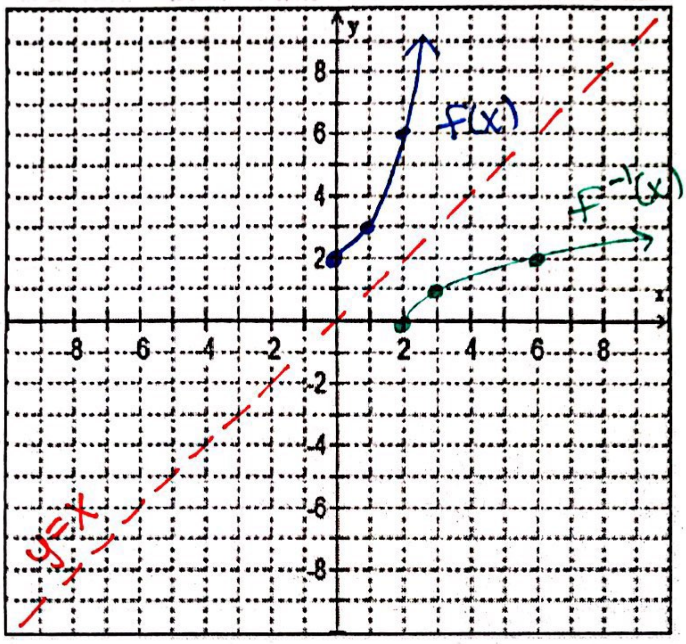
Jean Adams

G.N.A.W. on Inverse Functions

Name Key

Graph

$f(x) = x^2 + 2;\ x \geq 0$



Numerically

$f(x) = x^2 + 2;\ x \geq 0$

x	$f(x)$
0	2
1	3
2	6
3	11
4	18
5	27
6	38

x	$f^{-1}(x)$
2	0
3	1
6	2
11	3
18	4
27	5
38	6

Algebraic

Find the inverse algebraically.

$y = x^2 + 2$ $\quad x \geq 0$

$x = y^2 + 2$

$x + 2 = y^2$

$y = \sqrt{x-2}$

$f^{-1}(x) = \sqrt{x-2}\ ,\ x \geq 2$

Verbally

Use the table and the graph to answer the following:

$f(x) = x^2 + 2;\ x \geq 0$

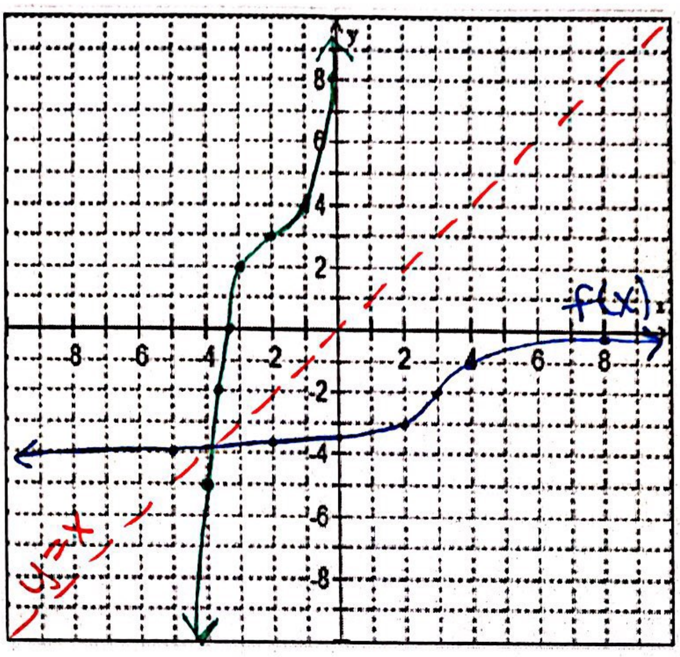
	Function	Inverse
Domain:	$[0, \infty)$	$[2, \infty)$
Range:	$[2, \infty)$	$[0, \infty)$
x-intercept	none	(2, 0)
y-intercept	(0, 2)	none

G.N.A.W. on Inverse Functions

Name Key

Graph

$f(x) = \sqrt[3]{x-3} - 2$



Numerically

$f(x) = \sqrt[3]{x-3} - 2$

x	$f(x)$
-5	-4
-2	-3.7
0	-3.4
2	-3
3	-2
4	-1
8	-0.3

x	$f^{-1}(x)$
-4	-5
-3.7	-2
-3.4	0
-3	2
-2	3
-1	4
-0.3	8

Algebraic

Find the inverse algebraically.

$y = \sqrt[3]{x-3} - 2$

$x = \sqrt[3]{y-3} - 2$

$x+2 = \sqrt[3]{y-3}$

$(x+2)^3 = y-3$

$y = (x+2)^3 + 3$

$f^{-1}(x) = (x+2)^3 + 3$

Verbally

Use the table and the graph to answer the following:

$f(x) = \sqrt[3]{x-3} - 2$

	Function	Inverse
Domain:	$(-\infty, \infty)$	$(-\infty, \infty)$
Range:	$(-\infty, \infty)$	$(-\infty, \infty)$
x-intercept	(11, 0)	(-3.4, 0)
y-intercept	(0, -3.4)	(0, 11)