

Given $f(x) = -2x + 2$ and $g(x) = -x^2 + 1$ find the following. Then, state the domain of each, except #14 #6

1.) $(f+g)(x)$ $D: \mathbb{R}$

$$-2x+2+(-x^2+1)$$

$$-x^2-2x+3$$

$$D: \mathbb{R}$$

$D: \mathbb{R}$

2.) $(f-g)(x)$

Distribute Negative

$$-2x+2-(-x^2+1)$$

$$-2x+2+x^2-1$$

$$x^2-2x+1$$

$$D: \mathbb{R}$$

3.) $(fg)(x)$

$$(-2x+2)(-x^2+1)$$

$$2x^3-2x-2x^2+2$$

$$2x^3-2x^2-2x+2$$

OR

$$2(x^3-x^2-x+1)$$

$$D: \mathbb{R}$$

* make sure you know how to find the domain of radical functions / do operations on them (see ex 2 in 1.8 notes)

4.) $(\frac{f}{g})(x)$

**factor both!*

$$\frac{-2x+2}{-x^2+1}$$

$$\frac{-2(x+1)}{-(x^2-1)}$$

$$\frac{-2(x+1)}{-(x^2-1)}$$

$$\frac{-2(x+1)}{-(x+1)(x-1)}$$

$$\frac{2}{x-1}$$

$$\frac{2}{x-1}$$

$$D: \mathbb{R}, x \neq 1$$

exclude values that make denom = 0

5.) $(f \circ g)(x)$

$$f(-x^2+1)$$

$$-2(-x^2+1)+2$$

$$2x^2-2+2$$

$$2x^2$$

$$D: \mathbb{R}$$

6.) $(g \circ f)(-2)$

$$g(-2x+2)$$

$$-(-2x+2)^2+1$$

$$-((-2x+2)(-2x+2))+1$$

$$-(4x^2-4x-4x+4)+1$$

$$-(4x^2-8x+4)+1$$

$$-4x^2+8x-4+1$$

$$-4x^2+8x-3$$

$$-16-16-3$$

$$-35$$

- 7.) If $h(x) = \frac{-x^2+3}{4-x^2}$ represents the composition of 2 functions, find each function, and show that it is in fact a composition of both.

* various answers

$$f(x) = \frac{-1-x}{-x} \quad g(x) = x^2-4$$

$(f \circ g)(x)$

$-(x^2-4)$
 $-x^2+4$
 $-x^2+4$
 $-2x^2$

Find the inverse of each function. Show all work.

8.) $f(x) = \frac{2x+3}{x-1}$

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

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

$$\begin{aligned} x(y-1) &= 2y+3 \\ xy-x &= 2y+3 \\ xy-2y &= 3+x \\ y(x-2) &= 3+x \end{aligned}$$

$$\begin{aligned} y &= \frac{3+x}{x-2} \\ f^{-1}(x) &= \frac{3+x}{x-2} \end{aligned}$$

10.) $f(x) = \frac{4x+3}{2x+5}$

$$y = \frac{4x+3}{2x+5}$$

$$x = \frac{4y+3}{2y+5}$$

$$\begin{aligned} x(2y+5) &= 4y+3 \\ 2xy+5x &= 4y+3 \\ 2xy-4y &= 3-5x \\ y(2x-4) &= 3-5x \\ y &= \frac{3-5x}{2x-4} \end{aligned}$$

$$f^{-1}(x) = \frac{3-5x}{2x-4}$$

9.) $f(x) = \frac{1}{1+x}$

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

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

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

$$x + xy = 1$$

$$xy = 1-x$$

$$y = \frac{1-x}{x}$$

$$f^{-1}(x) = \frac{1-x}{x}$$

11.) $f(x) = \sqrt{8x+6}$

$$y = \sqrt{8x+6}$$

$$x = \sqrt{8y+6}$$

$$x^2 = 8y+6$$

$$x^2-6 = 8y$$

$$\frac{x^2-6}{8} = y$$

$$f^{-1}(x) = \frac{x^2-6}{8}$$

* DO NOT forget to label $f^{-1}(x)$

similar

Circle true if the statement is true, and false if the statement is false.

- 12.) TRUE / FALSE The domain of the parent function $f(x) = \sqrt{x}$ is $[0, \infty)$

* Know how to recognize vert/horiz stretches/shrinks in comparison to parent functions

- 13.) TRUE / FALSE The parent function $f(x) = \frac{1}{x}$ has an x intercept, but no y intercept.
(no x or y intercept)

- 14.) TRUE / FALSE The parent function $f(x) = x^3$ has the same x and y intercepts.

- 15.) TRUE / FALSE The graph of $g(x) = (2x)^2$ would be a horizontal stretch of the parent function $f(x) = x^2$

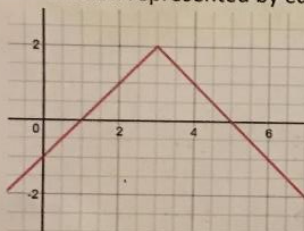
[horizontal shrink! (x values are halved)]

- 16.) TRUE / FALSE To graph of $k(x) = -(x-3)^2$, you would reflect over the x axis before shifting 3 to the right.

(parentheses first!)

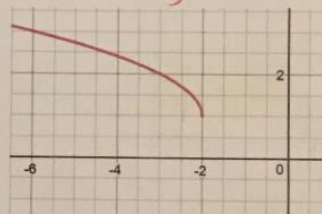
Write the function represented by each graph.

17.)



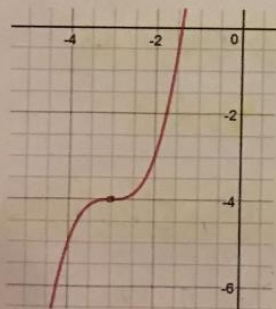
$$f(x) = -|x-3| + 2$$

18.)



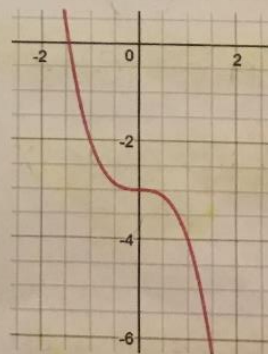
$$f(x) = \sqrt{-(x+2)} + 1$$

19.)



$$f(x) = (x+3)^3 - 4$$

20.)



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

Describe the transformations of each function in comparison to its parent function. If there is a specific order in which the transformations should occur, please write them in that order. For any vertical or horizontal stretches or shrinks, describe how the x or y values will change in comparison to the x or y values of the parent function.

21.) Parent function: $f(x) = \sqrt{x}$

a.) $g(x) = -\sqrt{(x-3)} + 1$

- ① shift 3 right
- ② flip over x axis
- ③ shift up 1

b.) $h(x) = -\sqrt{-x} - 2$

- ① flip over x axis
- ② flip over y axis
- ③ shift down 2

any order

22.) Parent function: $f(x) = |x|$

a.) $k(x) = -|x+4| + 4$

- ① shift left 4
- ② flip over x axis
- ③ shift up 4

acts as ()

b.) $m(x) = |-x| - 5$

- ① flip over y axis
- ② shift down 5