Algebra 2 STUDY GUIDE AII.6, AII.7 Functions Mrs. Grieser

Name: _____ Date: _____ Block: _____

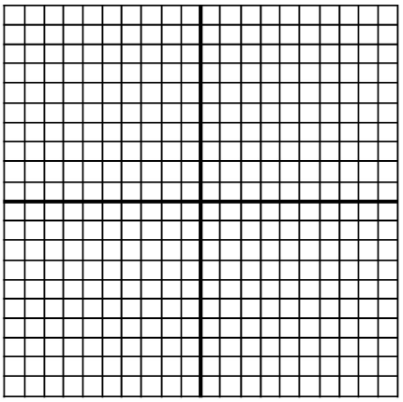
FUNCTIONS TEST STUDY GUIDE

Test covers:

- Graphing using transformations
- Analyzing functions, including finding domain/range in interval and/or set builder notation, identifying asymptotes, identifying intercepts, and working with composition of functions. Be able to find inverses of functions, and to determine whether the inverse of a function is a function itself.

Practice Questions:

1) Describe the transformations done to parent function y = |x| to graph y = |x+4| - 2. Then graph both functions.

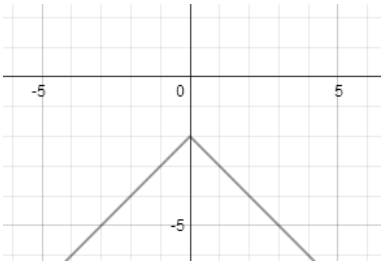


2) Write the equation of the graphs shown, using your knowledge of transformations. For each graph, identify the parent function and transformations made.

a) parent function: _____

transformation(s):_____

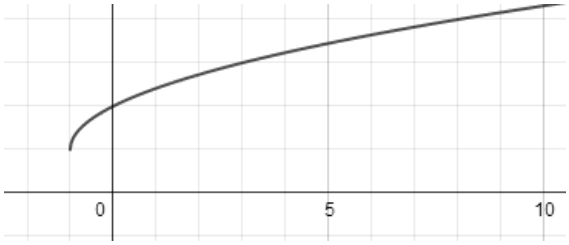
function: _____



b) parent function: _____

transformation(s):_____

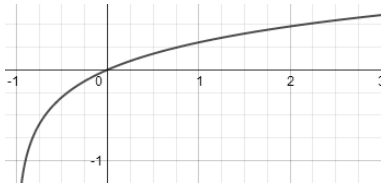
function: _____



c) parent function: _____

transformation(s):_____

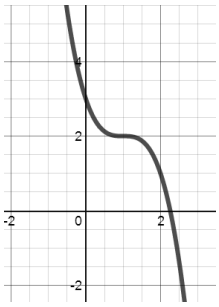
function: _____



d) parent function: _____

transformation(s):_____

function: _____

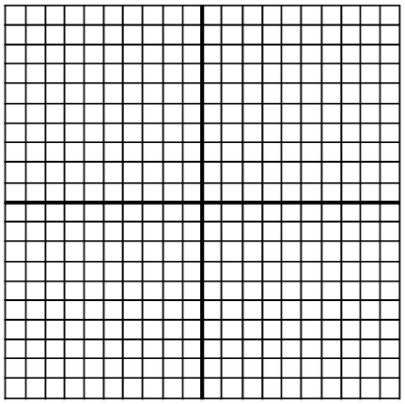


3) Sketch the graphs using transformations. List the parent function and the transformations you are making. Where requested, provide asymptotes and domain/range.

a) $f(x) = (x+2)^2 + 3$

parent function

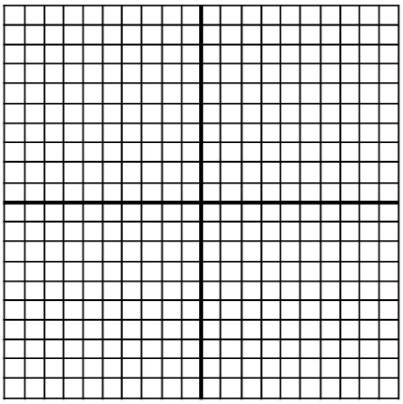
transformation(s):



b) $f(x) = \sqrt[3]{x} + 1$

parent function

transformation(s):



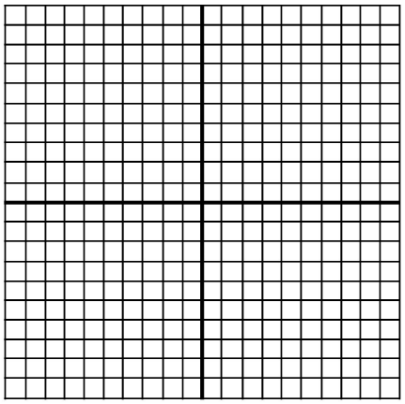
c) $f(x) = \log(x-1)$

parent function

transformation(s):

asymptotes:

domain/range:



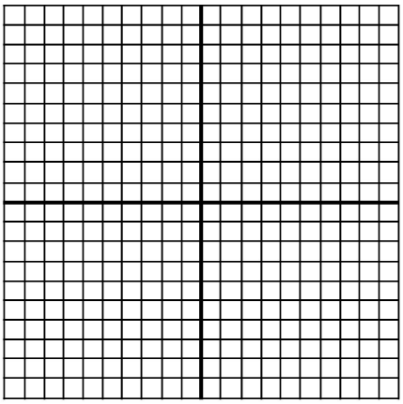
d) $f(x) = -2^{x+1}$

parent function

transformation(s):

asymptotes:

domain/range:



4) For each relation below, state the domain, range, whether the relation is a function, whether the relation is continuous or not, the zero(s) (if any), and the y-intercept(s) (if any). Supply asymptotes if requested.

a) domain:

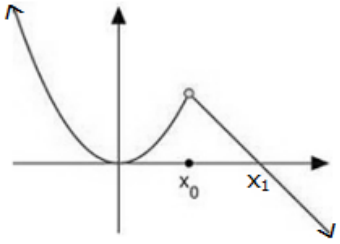
range:

function?

continuous?

zero(s):

y-intercept(s):



b) domain:

range:

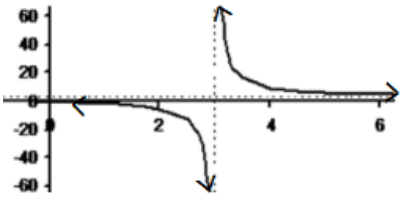
function?

continuous?

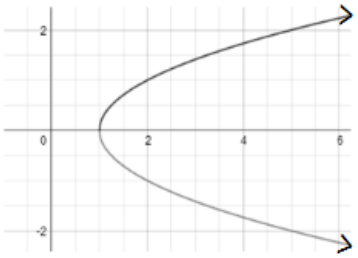
zero(s):

y-intercept(s):

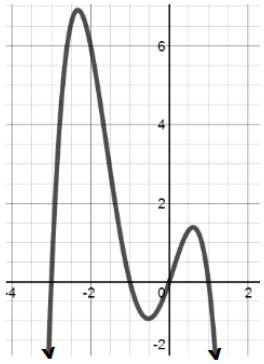
asymptotes:



c) domain:
range:
function?
continuous?
zero(s):
y-intercept(s):



d) domain:
range:
function?
continuous?
zero(s):
y-intercept(s):



5) Identify the domain and range on the real number system of the functions below in interval notation.

a) f(x) = 2x + 5 b) f(x) = x^2 - 3 c) f(x) = $-x^2$ + 4 d) f(x) = $\frac{1}{x+1}$

6) Find the requested composite function for the examples below.

a) f(x) = 2x + 3
g(x) = $-x^2$ + 1
Find (f∘g)(x)

b) p(x) = x + 2
h(x) = x^2
Find h(p(x)) and p(h(x))

c) f(x) = $2x^2$
g(x) = $\frac{1}{x+1}$
Find f(g(x)) and g(f(x))

d) f(x) = x + 5
g(x)=2x
h(x)=x - 2
Find (f∘g∘h)(x)

7) Given f(2) = 3, g(3) = 2, f(3) = 4 and g(2) = 5, evaluate (f∘g)(3).

8) Given: $f(x)=3+2x$, $g(x)=x^2-9$, $p(x)=\sqrt{x+25}$, and $k(x)=x^2-5x-6$ Find

a) k(5) – g(3) b) g(f(2)) c) g(p(x)) d) (f∘f)(3)

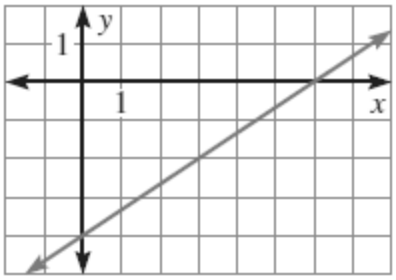
9) Write the inverse of the following functions. State whether the inverse is a function. Explain how you know the inverse of the function is a function.

a) f(x) = $\sqrt{x+3}$ b) y = $\frac{3x-2}{5}$ c) y = $2x^2$ - 1 d) g(x) = $\frac{1}{27}x^3$

10) Determine whether the following two functions are inverses of each other using composition of functions. Explain.

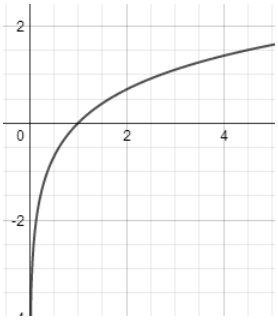
a) f(x) = 3x – 5; g(x) = $\frac{1}{3}x+\frac{5}{3}$ b) f(x) = x – 2; g(x) = x + 5

11) What is the equation of the inverse of the function whose graph is shown? Is the inverse a function? Why or why not?

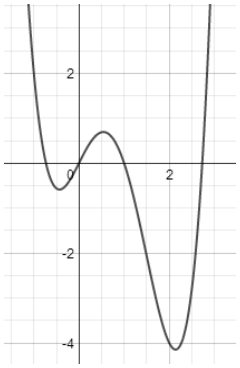


12) Look at the graph of the functions below and determine whether the inverse of the function will be a function. Explain.

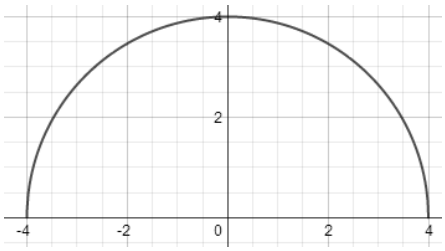
a)



b)



c)



Review questions:

13) Find the product of $(5 - 7i)(2 + 3i)$.

14) Find all roots (solve): $3|x - 14| - 6 = 21$

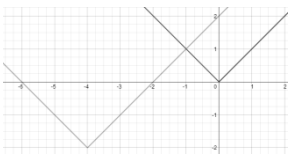
15) What are the solutions to $|3x - 7| \leq 5$?

16) Solve: $\sqrt[3]{x-4} = -5$

17) Solve: $\frac{\sqrt{2x}+2}{4} = 3$

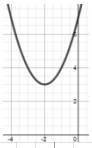
STUDY GUIDE ANSWERS

1) shift left 4, down 2

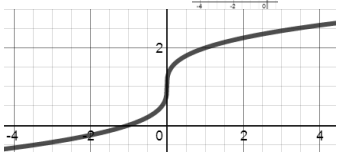


2) a) y=|x|; shift down 2, reflect over x-axis; y = -|x|-2
b) y = $\sqrt{x}$; shift left and up; y = $\sqrt{x+1}+1$
c) y = log x; shift left 1; y = log(x + 1)
d) y = x^3; shift right 1, up 2, reflect over x-axis; y = $-(x-1)^3+2$

3) a) y = x^2; shift left 2 up 3

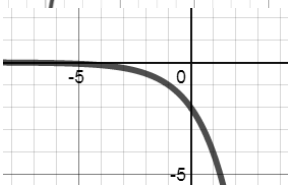


b) y= $\sqrt[3]{x}$; shift up 1



c) y = log x; shift right 1; asymptotes: x = 1; domain (1, ∞), range (-∞, ∞)

3d) y = 2^x; shift left 1, reflect over x-axis; asymptotes y = 0; domain (-∞, ∞), range (-∞, 0)



4) a) D (-∞, ∞) R (-∞, ∞), function, discontinuous, zeros: 0, x_0, and x_1, y-intercept: 0
b) D (-∞, 3)U(3, ∞) R (-∞,0)U(0, ∞), function, discontinuous, zeros: none, y-intercept: hard to tell, but a negative number close to 0 asymptotes: x=3, y=0
c) D [1, ∞) R (-∞,∞], not a function, continuous, zeros: 1, y-intercept: none
d) D (-∞, ∞) R (-∞,7], function, continuous, zeros: -3, -1, 0, 1; y-intercept: 0

5) 5) a) D (-∞, ∞) R (-∞, ∞)
b) D (-∞, ∞) R [-3, ∞)
c) D (-∞, ∞) R (-∞, 4]
d) D (-∞, -1)U(-1, ∞) R (-∞, 0)U(0, ∞)

6) a) $(f\circ g)(x) = -2x^2+5$
b) $h(p(x))=x^2+4x+4$, $p(h(x))=x^2+2$
c) $f(g(x))= \frac{2}{x^2+2x+1}$, $g(f(x))= \frac{1}{2x^2+1}$
d) $(f\circ g\circ h)(x) = 2x+1$

7) 3

8) a) -6 b) 40 c) x+16 d) 21

9) a) $y=x^2-3$, $x\geq 0$; inverse is a function because original function is 1-1
b) $y=\frac{5x+2}{3}$; inverse is a function (same reason)
c) $y=\pm\sqrt{\frac{x+1}{2}}$; inverse not a function since original function not 1-1
d) $y=3\sqrt[3]{x}$; inverse is function because g is 1-1

10) a) yes because f(g(x))=g(f(x))=x
b) no; even though f(g(x))=g(f(x)), the compositions don't = x.

11) $y=\frac{3}{2}x+6$; yes the inverse is a function because the original function is one-to-one

12) a) yes (1-1 function) b,c) no (not 1-1 functions)

13) $31+i$

14) x = 5, 23

15) $\frac{2}{3}\leq x\leq 4$

16) x = -121

17) x = 50