Unit 1B Review - Functions Name: Key

CP Pre-Calculus

Section A: ODD, EVEN, NEITHER

Determine if the function is odd, even or neither:

1. $f(x)=\dfrac{x^2-4}{x^4+2}$

$f(-x)=\dfrac{(-x)^2-4}{(-x)^4+2}=\dfrac{x^2-4}{x^4+2}$

$=f(x)$ Even!

2. $h(x)=\dfrac{1+x^2}{x}$

$h(-x)=\dfrac{1+(-x)^2}{-x}$

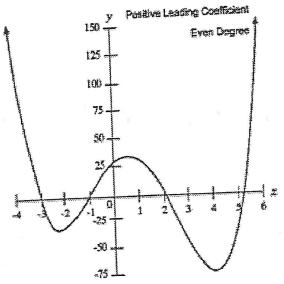
$=\dfrac{1+x^2}{-x}$

$=-f(x)$ odd!

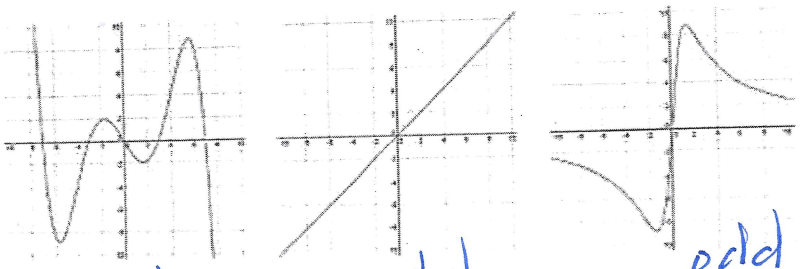
3. $f(x)=1-2x^5$

$f(-x)=1+2x^5$

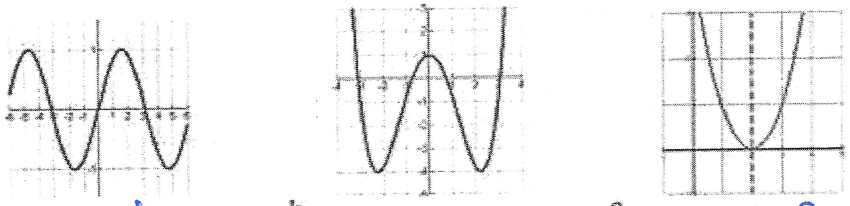
neither

4. 

neither

5. 

odd odd odd

6. 

a. odd b. even c. even

SECTION B: Parent Functions and Transformations

Standard form of a function: $af(bx-c)+d$

What does each variable control and how? Write in the correct order in which you'd perform the translations. Don't forget how the "b" impacts the x!

a: vertical stretch/compression & reflection over x-axis

b: (±1 only for now) reflection over y-axis

c: horizontal shift

d: vertical shift

Directions: Name & graph the parent function using a dashed line, and then describe the translation that will occur in words or as algebraic expressions. Graph!

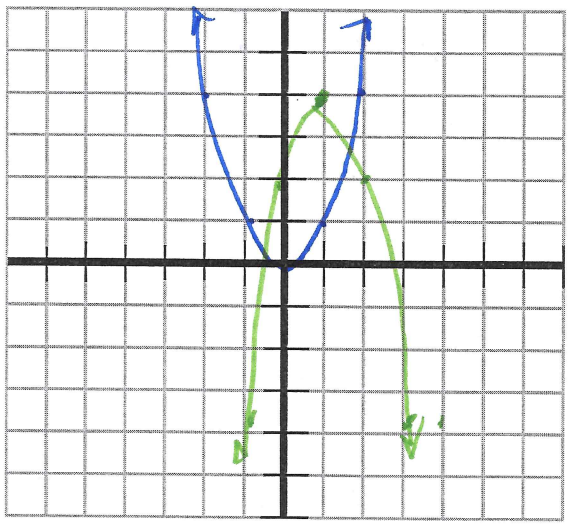
$f(x)=x^2$ quadratic

1. $f(x) = -2(x-1)^2+4$

a: -2
b: 1
c: 1
d: 4

x	y
0	0
1	1
-1	1
2	4
-2	4

x+1	-2y+4
1	4
2	2
0	2
3	-4
-1	-4



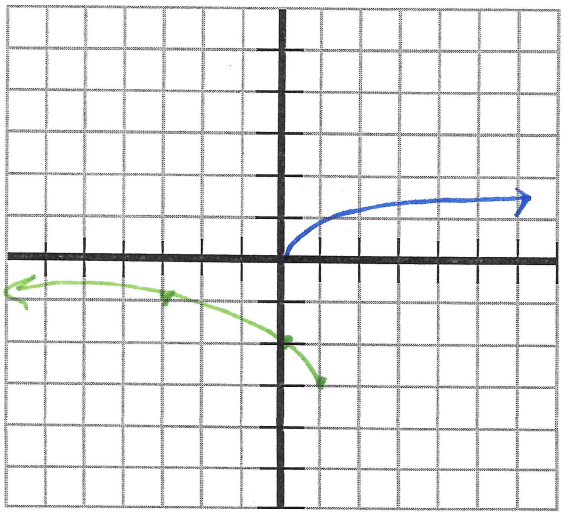
$f(x)=\sqrt{x}$ radical

2. $f(x) = \sqrt{-(x-1)}-3$

a: 1
b: -1
c: 1
d: -3

x	y
0	0
1	1
4	2
9	3

-x+1	y-3
1	-3
0	-2
-3	-1
-8	0



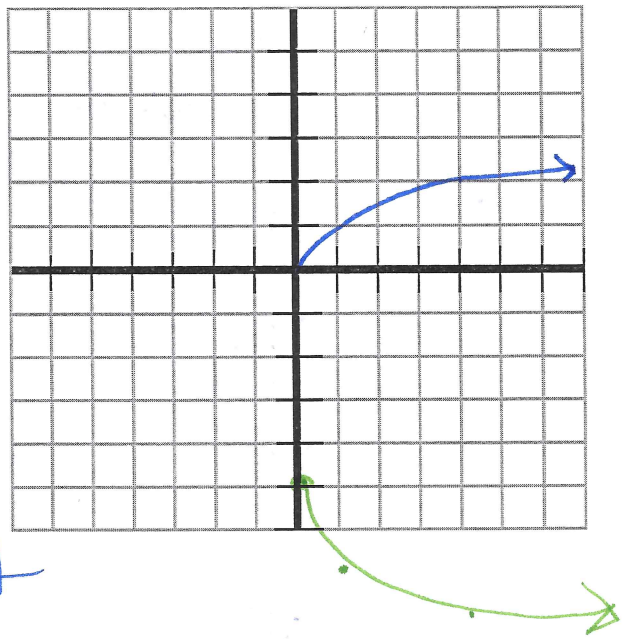
radical $y = \sqrt{x}$

x	y
0	0
1	1
4	2

3. $f(x) = -2\sqrt{x} - 5$

a: -2
b: 1
c: 0
d: -5

x	-2(4)-5
0	-5
1	-7
4	-9



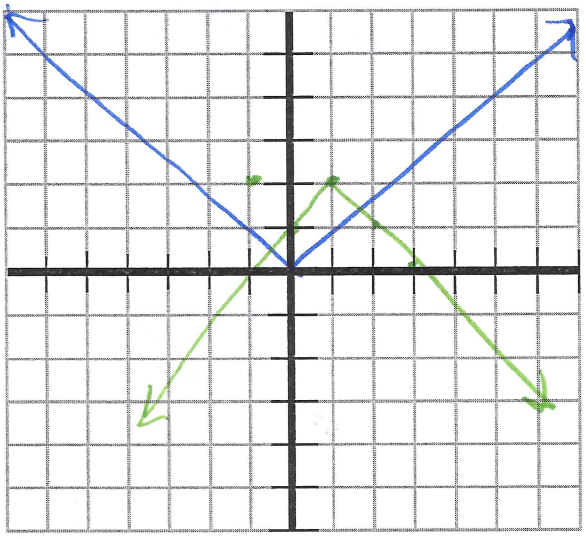
A.V. $y = |x|$

x	y
0	0
-1	1
1	1
2	2
-2	2

4. $g(x) = -|(x-1)| + 2$

a: -1
b: 1
c: 1
d: 2

x+1	-|x|+2
1	2
0	1
2	1
3	0
-1	0



Directions: Now, work backwards. Given the parent function and translation(s), write the function.

5. $f(x) = \sqrt{x}$

Reflect over the y axis. b: -1

Translate 1 unit down. d: -1

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

6. $f(x) = x^2$

Reflect over the x axis. a: -1

Vertical shrink by a factor of ½ a: 1/2

Translate 1 unit left and 3 units down $f(x) = \frac{1}{2}(x+1)^2 - 3$

c: 1 d: -3

7. $f(x) = x^3$

Translate 2 units left c: 2

Reflect over the x axis. a: -1

Translate 1 unit up d: 1 $f(x) = -(x+2)^3 + 1$

8. $f(x) = |x|$

Horizontal shift 3 left. c: 3

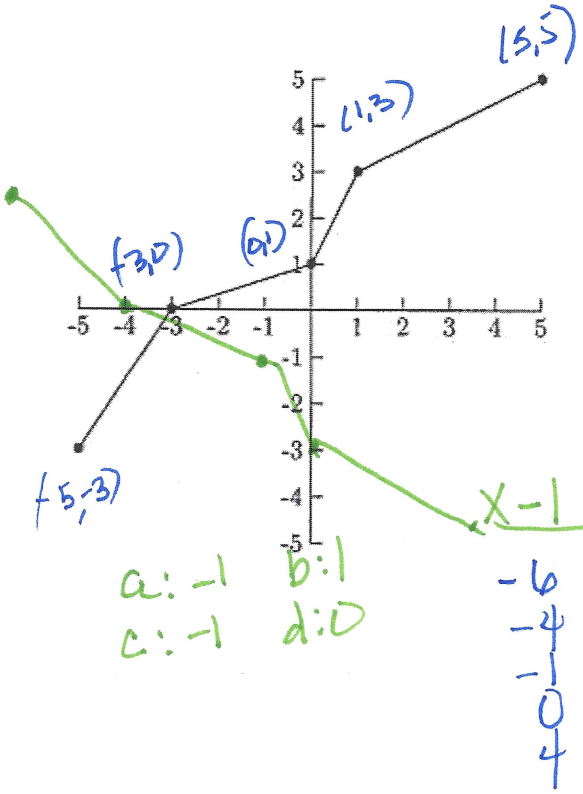
Vertically stretch the y values by factor of 5. a: 5

Reflect over the x. a: -1

Translate 6 units down. d: -6 $f(x) = -5|x+3| - 6$

9. Use the graph of f(x) to graph g(x).

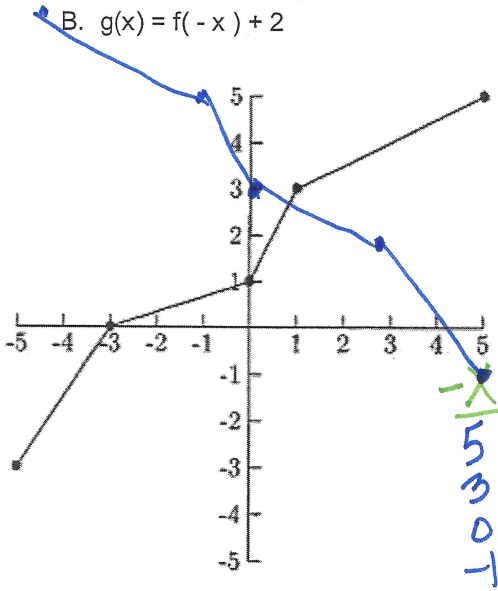
A. $g(x) = -f(x+1)$



x	y
-5	-3
-3	0
0	1
1	3
5	5

x-1	-y
-6	3
-4	0
-1	-1
0	-3
4	-5

B. g(x) = f(- x) + 2



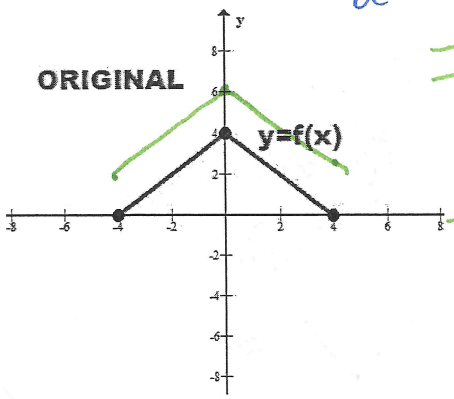
b: -1
d: 2

-x	y+2
5	-1
3	2
0	3
-1	5
-5	7

Think of f(x) as the parent function.

10a. Use the graph of f(x) to graph g(x).

$g(x) = f(-1x) + 2$ b: -1 d: 2

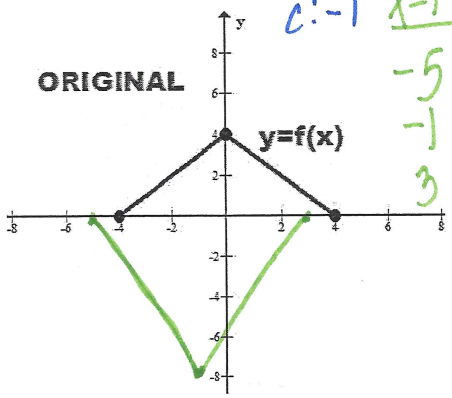


x	y
-4	0
0	4
4	0

-x	y+2
4	2
0	6
-4	2

10b. Use f(x) to graph h(x).

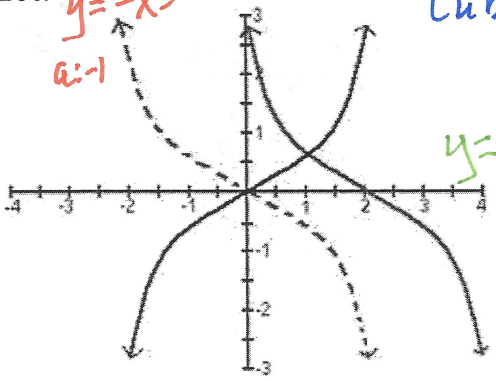
$h(x) = -2f(x+1)$ a: -2 b: 1 c: -1



x-1	-2y
-5	0
-1	-8
3	0

Write the equations of the following parent & transformed functions. Not all graphs include the parent function. Sketch it if necessary.

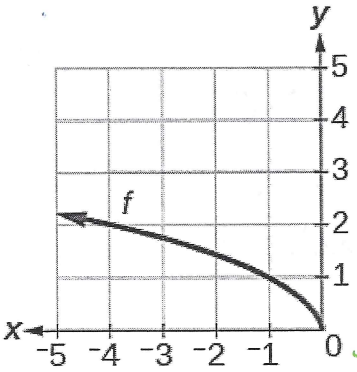
10c. $y = -x^3$ a: -1



Cubic $y = x^3$

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

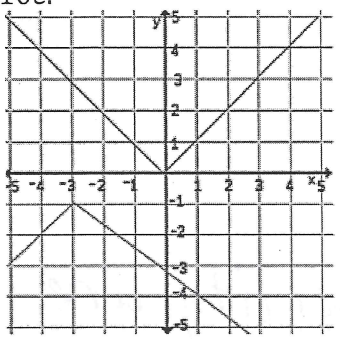
10d.



radical $y = \sqrt{x}$

$y = \sqrt{-x}$

10e.



P.V. $y = |x|$

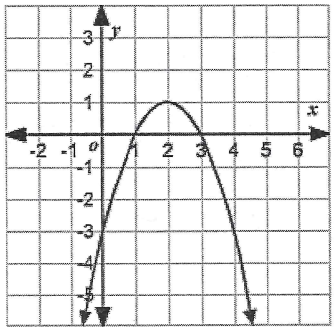
a: -1

c: 3

d: -1

$y = -|x+3| - 1$

10f.



quadratic $y = x^2$

a: -1

b: 1

c: -2

d: 1

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

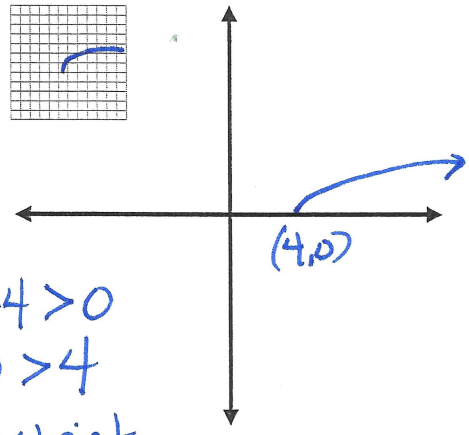
11. State the domain and range for each of the following functions. What x values must be excluded? What does the graph look like compared to the parent function? Only graph if you have to! Then write in interval notation. Where is the function increasing? Decreasing?

A) $f(p)=\sqrt{p-4}$

D: $[4,\infty)$

R: $[0,\infty)$

Incr: $(4,\infty)$



$p-4>0$

$p>4$

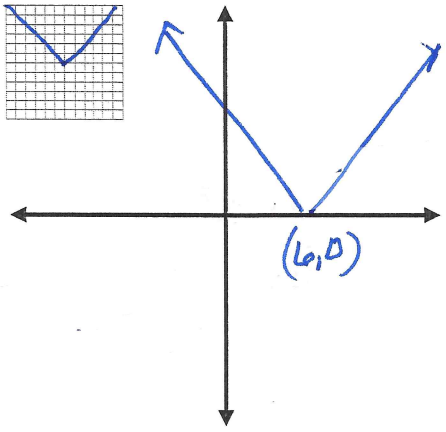
restrict

b) $f(x)=|x-6|$

D: $(-\infty,\infty)$

R: $[0,\infty)$

Decr: $(-\infty,6)$



Section 3: Inverses

Functions are verified as inverses if

$f(g(x))=x$ and $g(f(x))=x$

Steps to create the equation of an inverse:

1. set $=y$, if necessary
2. $x \leftrightarrow y$
3. solve for y

Graphically, the inverse will be a reflection about identity line $y=x$

12-13. Find $f(g(x))$ *and* $g(f(x))$ to verify whether the pair of functions given below are inverses of each other using function composition.

12. $f(x)=6x+7$ and $g(x)=\frac{x-7}{6}$.

$f(g(x)) = f\left(\frac{x-7}{6}\right) = 6\left(\frac{x-7}{6}\right)+7$

$= x-7+7$

$= x$ ✓

$g(f(x)) = g(6x+7)$

$= \frac{6x+7-7}{6}$

$= \frac{6x}{6} = x$ ✓

yes, they are functions of each other as $f(g(x)) = x$ + $g(f(x)) = x$

13. $f(x)=1-x^3$

$g(x)=\sqrt[3]{1-x}$

$f(g(x)) = f\left(\sqrt[3]{1-x}\right) = 1-\left(\sqrt[3]{1-x}\right)^3$

$= 1-(1-x) = x$ ✓

$g(f(x)) = g(1-x^3)$

$= \sqrt[3]{1-(1-x^3)}$

$= \sqrt[3]{x^3}$

$= x$ ✓

14. Is the function $f(x)=4x^2-16$ one to one? n/d Why or why not?

Parabola: fails H.L.T.

15. Find the inverse of $f(x)=\frac{5-3x}{2}$. Is the function one-to-one? Is the inverse a function? Why or why not? yes, this is a linear function, which passes the H.L.T.

16. Given the graph bellow, graph the inverse.