

1 C Perform the indicated operation.

1) $h(x) = 3x - 2$
 $g(x) = -x^2 - 4x$
 Find $(h - g)(x)$

$$(3x - 2) - (-x^2 - 4x)$$

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

$$\boxed{x^2 + 7x - 2}$$

3) $g(n) = -3n + 4$
 $h(n) = n^2 + 3$
 Find $(g \circ h)(n)$

$$-3(n^2 + 3) + 4$$

$$-3n^2 - 9 + 4$$

$$\boxed{-3n^2 - 5}$$

2) $h(x) = -3x - 4$
 $g(x) = -4x - 1$
 Find $(h \cdot g)(x)$

$$(-3x - 4)(-4x - 1)$$

$$12x^2 + 3x + 16x + 4$$

$$\boxed{12x^2 + 19x + 4}$$

4) $f(a) = a + 5$
 $g(a) = a^2 + a - 20$
 Find $\left(\frac{f}{g}\right)(a)$

$$\frac{a+5}{a^2+a-20} = \frac{a+5}{(a+5)(a-4)}$$

$$= \boxed{\frac{1}{a-4}}$$

3 C Find the inverse of each function.

5) $f(n) = \sqrt[3]{n+2} - 1$
 $y = \sqrt[3]{n+2} - 1$

$$(n+1)^3 = y+2$$

$$n = \sqrt[3]{y+2} - 1$$

$$(n+1)^3 - 2 = y$$

$$(n+1)^3 = \sqrt[3]{y+2} + 1$$

$$\boxed{f^{-1}(n) = (n+1)^3 - 2}$$

6) $g(x) = -2x - 4$

$$y = -2x - 4$$

$$x = \frac{-2y - 4}{-2}$$

$$\frac{x+4}{-2} = \frac{-2y}{-2}$$

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

State if the given functions are inverses.

7) $g(n) = 2n + 4$
 $f(n) = \frac{-4+n}{2}$

8) $f(x) = \frac{-2 + \sqrt[3]{4x}}{2}$
 $g(x) = (x+3)^3$

$$(f \circ g)(n) = \frac{-4 + 2n + 4}{2}$$

$$= \frac{2n}{2} = n \quad \boxed{\text{YES}}$$

$$(f \circ g)(x) = \frac{-2 + \sqrt[3]{4(x+3)^3}}{2}$$

$$\boxed{\text{NO}}$$

2 NC

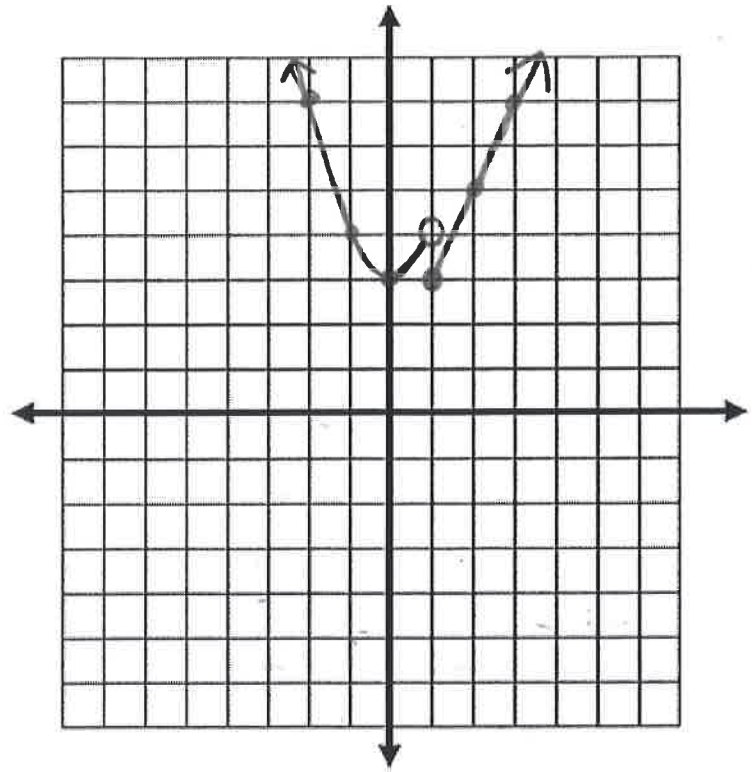
$$f(x) = \begin{cases} 2x+1 & x \geq 1 \\ x^2+3 & x < 1 \end{cases}$$

Function? Yes or No

$$f(-2) = (-2)^2 + 3 = 7$$

$$f(6) = 2(6) + 1 = 13$$

$$f(1) = 2(1) + 1 = 3$$



$$2x+1$$

$$x^2+3$$

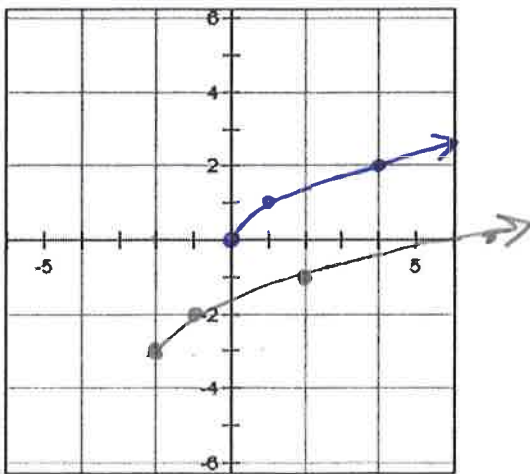
x	y
1	3
2	5
3	7

x	y
1	4
0	3
-1	4
-2	7

5 NC

For each equation, graph the parent graph in COLORED PENCIL, and graph the transformed graph in PENCIL. Then, identify the domain and range (in interval notation) of the transformed graph.

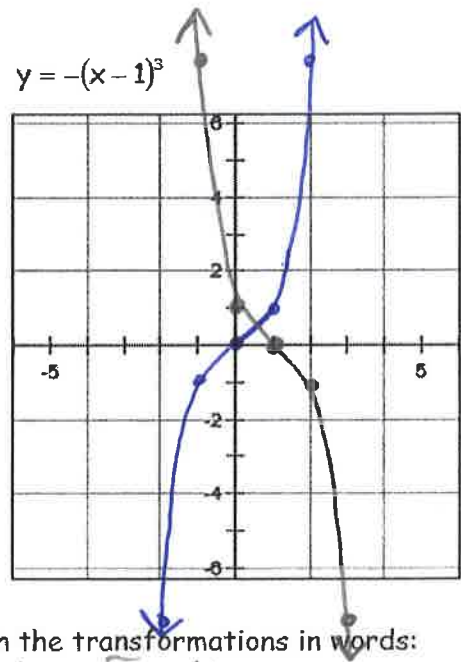
1) $y = \sqrt{x+2} - 3$



Explain the transformations in words:

Square Root Function
 Horizontal shift left 2 units
 Vertical shift down 3 units

2) $y = -(x-1)^3$



Explain the transformations in words:

Cubic Function
 Reflected about x-axis
 Horizontal shift right 1 unit

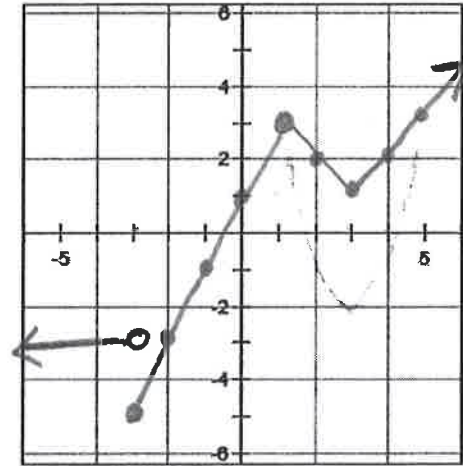
2) NC Use your knowledge of parent graphs, transformations, and lines to graph this piecewise function.

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

-3	
X	Y
-3	-3
-4	-3
-5	-3

2x+1	
X	Y
-3	-5
-2	-3
-1	-1
0	1
1	3

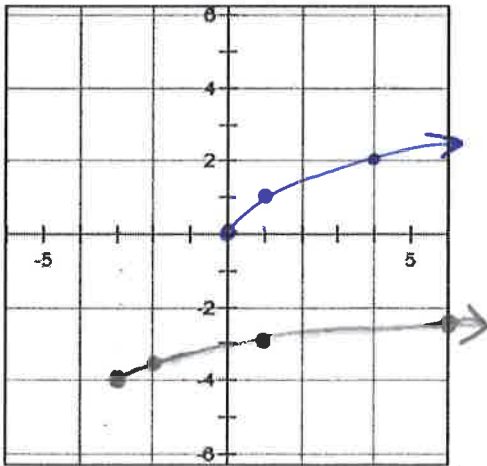
x-3 +1	
X	Y
1	3
2	2
3	1
4	2



5) NC For each description, find the equation, graph the parent graph in COLORED PENCIL, and graph the transformed graph in PENCIL. Then, identify the domain and range (in interval notation) of the transformed graph.

1) Description:

- A Square Root Function
- Vertical shrink by a factor of 1/2
- Vertical Shift down 4 units
- Horizontal Shift left 3 unit



EQUATION: $f(x) = \frac{1}{2}\sqrt{x+3} - 4$

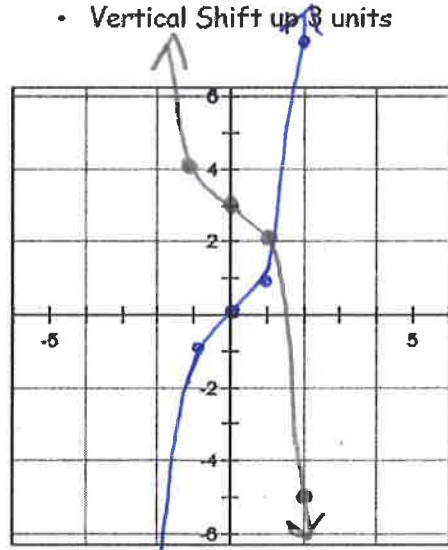
Domain: $[-3, \infty)$

Range: $[-4, \infty)$

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

2) Description:

- A Cubic Function
- Reflected over the x-axis
- Vertical Shift up 3 units



EQUATION: $f(x) = -x^3 + 3$

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

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

6C

Determine the following:

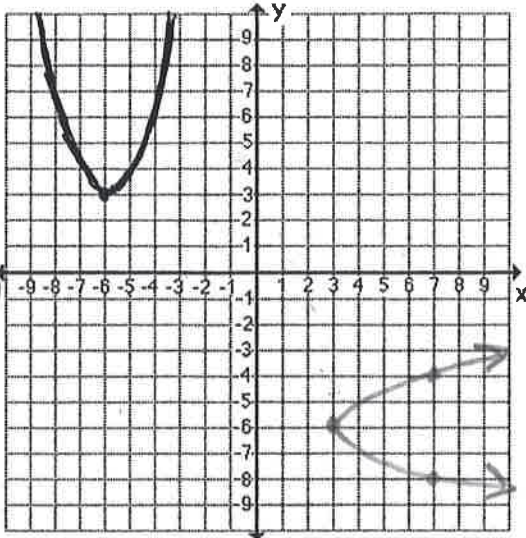
- 1) Domain and Range in interval notation.
- 2) Is the Inverse a function?

$f(x)$

Asymptote @ $x = -2$
 Asymptote @ $y = -6$
 point at $(-3, -5)$
 point at $(-1, -7)$

$f^{-1}(x)$

Asymptote @ $y = -2$
 Asymptote @ $x = -6$
 point at $(-3, -3)$
 point at $(-7, -1)$

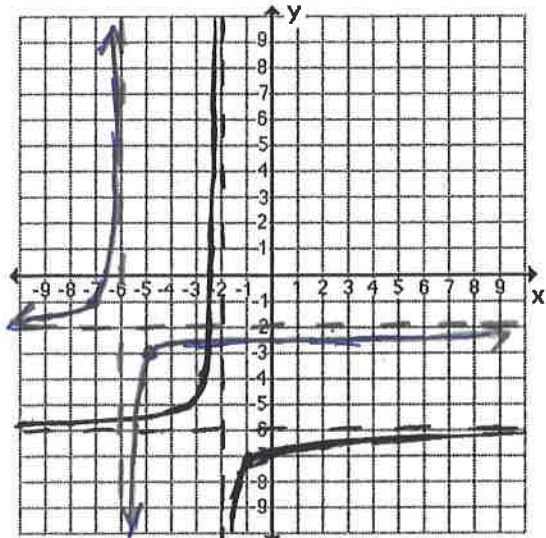


$f(x)$
 $(-6, 3)$
 $(-8, 7)$
 $(-4, 7)$

$f^{-1}(x)$
 $(3, -6)$
 $(7, -8)$
 $(7, -4)$

1) $D: (-\infty, \infty)$ $R: [3, \infty)$

2) No



1) $D: (-\infty, -2) \cup (-2, \infty)$
 $R: (-\infty, -6) \cup (-6, \infty)$

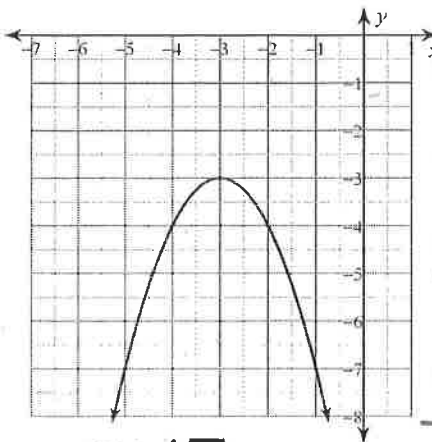
2) YES

NC

Determine the following for each graph:

- 1) The Zeros (Roots, Solutions)
- 2) The X-intercepts
- 3) The Factors

$y = -x^2 - 6x - 12$



$$\frac{6 \pm \sqrt{6^2 - 4(-1)(-12)}}{2(-1)}$$

$$\frac{6 \pm \sqrt{36 - 48}}{-2}$$

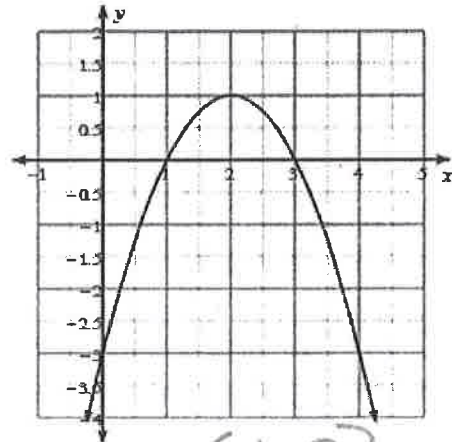
$$\frac{6 \pm \sqrt{-12}}{-2}$$

$$\frac{6 \pm \sqrt{-1} \sqrt{4} \sqrt{3}}{-2}$$

$$\frac{6 \pm 2i\sqrt{3}}{-2}$$

$$-3 \pm i\sqrt{3}$$

Zeros: $-3 \pm i\sqrt{3}$
 X-Int: None!
 Factors: None!



Zeros: $\{1, 3\}$
 X-Int: $(1, 0), (3, 0)$
 Factors: $(x-1)(x-3)$