HW 6.8

1. $f^{-1}(x) = x^2 + 2x + 1$
2. $f^{-1}(x) = \frac{1-3x}{2x+2}$
3. a. var in denom
   b. D: $\{x|x \neq 3/2\}$
   c. see graph next page
   d. R: $\{y|y \neq 0\}$
4. a. var under radical
   b. D: $\{x|x \leq 3\}$
   c. see graph next page
   d. R: $\{y|y \geq 0\}$
5. $P(x) = x^2$ Quadratic
   $r_{x\text{-axis}}$, left 1, down 2
6. $P(x) = \sqrt{x}$ Sqr. root
   vertical stretch 2, right 1
7. $P(x) = x^3$ cubic
   right 3, up 1
8. $P(x) = x$ linear
   Vertical Stretch 3
   down 4
9. b
10. D: [-5, 11]

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Find the inverse for each function algebraically.

1. $f(x) = \sqrt{x} - 1$ D: $\{x|x \geq 0\}$ R: $\{y|y \geq -1\}$

$x = \sqrt{y} - 1$
$(x+1)^2 = y$
$f^{-1}(x) = (x+1)^2$
D: $\{x|x \geq -1\}$
R: $\{y|y \geq 0\}$

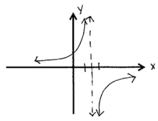
2. $f(x) = \frac{1-2x}{2x+3}$ D: $\{x|x \neq -\frac{2}{3}\}$ R: $\{y|y \neq -1\}$

$x = \frac{1-2y}{2y+3}$
$2xy + 3x = 1 - 2y$
$2xy + 2y = 1 - 3x$
$y(2x+2) = 1 - 3x$
$y = \frac{1-3x}{2x+2}$
$f^{-1}(x) = \frac{1-3x}{2x+2}$ $\{x|x \neq -1\}$ $\{y|y \neq -\frac{2}{3}\}$

For each of the following,
a. State the type of trouble.
b. Find the domain algebraically.
c. Sketch the graph.
d. Use the graph to find the range.

3. $y = \frac{2}{3-2x}$

a. var in denominator
$3 - 2x = 0$
$x = 3/2$

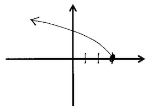
c. 

b. $\{x|x \neq 3/2\}$

d. $\{y|y \neq 0\}$

4. $y = \sqrt{3-x}$

a. variable under $\sqrt{\ }$
$3 - x \geq 0$
$-x \geq -3$

c. 

b. $\{x|x \leq 3\}$

d. $\{y|y \geq 0\}$

Jan 11-9:02 PM

Give the name of the parent function and describe the transformation (read left to right)

5. $f(x) = -(x+1)^2 - 2$
Parent: $P(x) = x^2$ Quadratic
Transformation(s):
$r_{x\text{-axis}}$
left 1
down 2

6. $g(x) = 2\sqrt{x-1}$
Parent: $P(x) = \sqrt{x}$ square root
Transformation(s):
vertical stretch 2
right 1

7. $j(x) = (x-3)^3 + 1$
Parent: $P(x) = x^3$ Cubic
Transformation(s):
right 3
up 1

8. $k(x) = 3x - 4$
Parent: $P(x) = x$ linear
Transformation(s):
Vertical stretch 3
down 4

Dec 5-8:53 AM

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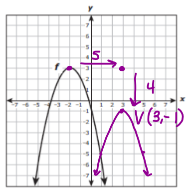
9. The graph of the quadratic function f is shown below. If the graph of f is translated 5 units to the right and 4 units down to create a new graph, which function best represents this new graph?

$g(x) : x^2$

a. $g(x) = -(x + 3)^2 - 1$
b. $g(x) = -(x - 3)^2 - 1$ $\rightarrow (3, -1)$
c. $g(x) = (3 - x)^2 + 1$
d. $g(x) = (3 - x)^2 - 1$



10. Given the table of values for f, what is the domain for f^{-1} (in interval notation)?

x	-3	-1	0	2	3	5
y	-5	-1	1	5	7	11

f(x): D: [-3,5]
R: [-5,11]
$f^{-1}(x)$ D [-5,11]

$\{-5, -1, 1, 5, 7, 11\}$

this is a line but a list of points usually not interval notation

Nov 27-2:18 PM

Applications of Functions

Jan 16-8:09 PM

Warm-Up: Let $f(x) = 3x + 1$ and $g(x) = x^2 - 1$. Perform each indicated operation. State domain restrictions where they exist.

1. $(f \cdot g)(x)$
2. $(f - g)(x)$
3. $(f \div g)(x)$
4. $g(f(x))$

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Warm-Up: Let $f(x) = 3x + 1$ and $g(x) = x^2 - 1$. Perform each indicated operation. State domain restrictions where they exist.

1. $(f \cdot g)(x) = f(x) \cdot g(x)$
$= (3x+1)(x^2-1)$
$= 3x^3 + x^2 - 3x - 1$

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

3. $(f \div g)(x) = \frac{f(x)}{g(x)} = \frac{3x+1}{x^2-1}$
$= \frac{3x+1}{(x-1)(x+1)}, \; x \neq \pm 1$

4. $g(f(x)) = g(3x+1)$
$= (3x+1)^2 - 1$
$= (3x+1)(3x+1) - 1$
$= 9x^2 + 6x + 1 - 1$
$= 9x^2 + 6x$

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1. How can you rewrite $y = \sqrt{9x+18}$ so you can graph it using transformations? Think about the following: what is the parent graph and what transformations have occurred?

$y = \sqrt{x}$ $\quad y = \sqrt{9x+18} = \sqrt{9(x+2)}$
$= 3\sqrt{x+2}$

① Vertical Stretch of 3
② Left 2

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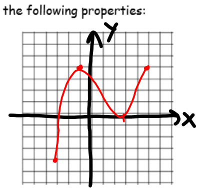
2. On the accompanying graph, draw a function that has the following properties:

a. Domain: [-3, 5] Start (-3, -4)
b. Range: [-4, 4] End (5, 4)
c. Decreasing in the interval (-1, 3)
d. Maximum at (-1, 4)



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3. Given $f(x) = x + 2$ and $g(x) = x^2 + 2x$, perform the operation or composition. State domain restrictions if they exist.

a. $f(x) + g(x)$

b. $g(f(x))$

c. $\left(\frac{g}{f}(x)\right)$

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3. Given $f(x) = x + 2$ and $g(x) = x^2 + 2x$, perform the operation or composition. State domain restrictions if they exist.

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

b. $g(f(x)) = g(x+2) = (x+2)^2 + 2(x+2)$
$= (x+2)(x+2) + 2x + 4$
$= x^2 + 4x + 4 + 2x + 4$
$= x^2 + 6x + 8$

c. $\left(\frac{g}{f}(x)\right) = \frac{g(x)}{f(x)} = \frac{x^2+2x}{x+2} = \frac{x(x+2)}{(x+2)} = x, \; x \neq -2$

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4. Given the function $f(x) = x^3 + 2x$ write a function that is

a. 3 units up and 1 unit left
$f(x) = (x+1)^3 + 2(x+1) + 3$

b. 2 units down and 4 units right
$f(x) = (x-4)^3 + 2(x-4) - 2$

c. Reflected in the x-axis and vertically stretched by a factor of 2
$f(x) = -2(x^3 + 2x) = -2x^3 - 4x$

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Dec 11-7:41 AM