College Algebra

Name: _____

Unit 1 Review

Date: _____ Period: _____

From your book: pg2. 152-153
    #1-10: match, name the function, and describe the shifts and end behavior
    #11-**15**: find the domain and range of each function
    #25-2**6**: graph and state the intervals on which the function is increasing and decreasing
    #33·   : state the relative extrema
    #41-44: find the inverse

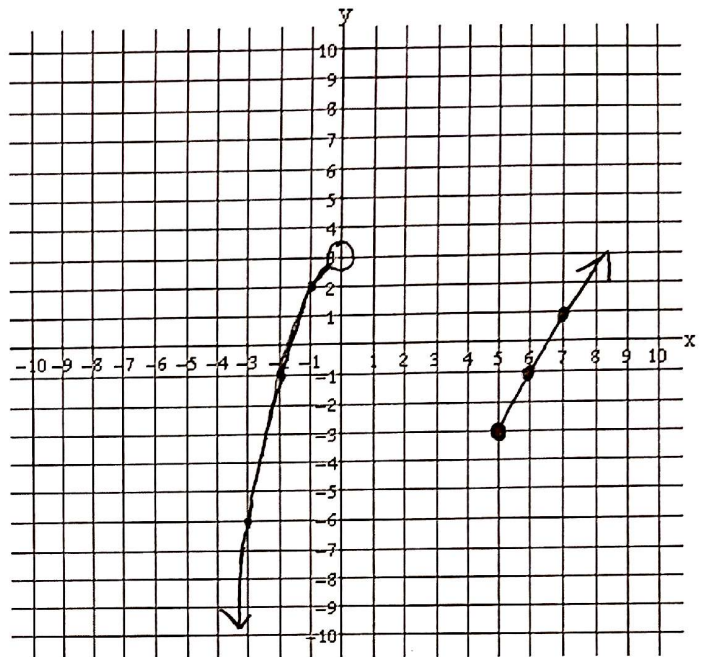**Graph each piecewise function and then state the domain and range.**

1.) $f(x) = \begin{cases} 2x-13 & x \geq 5 \\ 3-x^2 & x < 0 \end{cases}$

x	f(x)
5	-3
6	-1
7	1

x	f(x)
0	3
-1	2
-2	-1

Domain: $(-\infty, 0) \cup [5, \infty)$

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

2.) $f(x) = \begin{cases} (x-3)^2 & 0 < x < 3 \\ \sqrt{x-1}-5 & x \geq 1 \\ 9 & -7 < x < -3 \end{cases}$
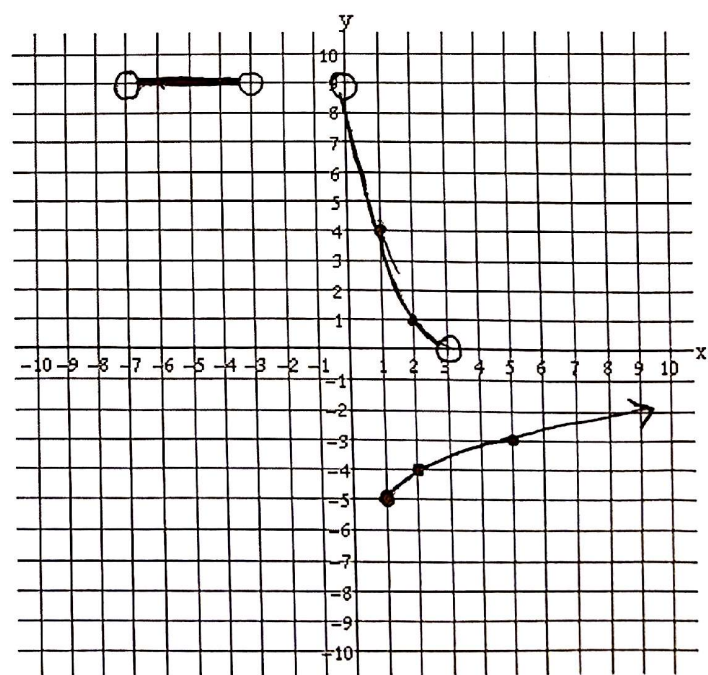
x	f(x)
0	9
1	4
2	1
3	0

x	f(x)
1	-5
2	-4
5	-3

x	f(x)
0	-7
0	-3

9

Domain: $(-7, -3) \cup (0, \infty)$

Range: $[-5, \infty)$

Let $f(x) = 2x - 1$, $g(x) = 3x$, and $h(x) = 2x^2 - 3x + 1$. Compute the following:

3.) $f(g(-3))$

$g(-3) = 3(-3) = -9$

$f(g(-3)) = 2(-9) - 1$

$= -18 - 1$

$= \boxed{-19}$

4.) $f(h(x))$

$f(h(x)) = 2(\quad) - 1$

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

$= 4x^2 - 6x + 2 - 1$

$= \boxed{4x^2 - 6x + 1}$

5.) $g(h(3))$

$h(3) = 2(3)^2 - 3(3) + 1$

$= 2(9) - 9 + 1$

$= 18 - 9 + 1 = 10$

$g(h(3)) = 3(10)$

$= \boxed{30}$

Find the inverse for each function.

6.) $y = \frac{3}{4}x - 2$

$x = \frac{3}{4}y - 2$

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

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

$\boxed{\frac{4}{3}(x + 2) = f^{-1}(x)}$ yes, function

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

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

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

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

$\sqrt{x - 3} = y - 2$

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

$\boxed{\sqrt{x - 3} + 2 = f^{-1}(x)}$ yes, function

8.) $y = \sqrt[3]{2x + 1} - 4$

$x = \sqrt[3]{2y + 1} - 4$

$x + 4 = \sqrt[3]{2y + 1}$

$(x + 4)^3 = 2y + 1$

$(x + 4)^3 - 1 = 2y$

$\boxed{\dfrac{(x + 4)^3 - 1}{2} = f^{-1}(x)}$ yes, function

Verify if the following functions are inverses of each other.

9.) $f(x) = 2x - 5$ and $g(x) = \frac{1}{2}x + \frac{5}{2}$

$f(g(x)) = 2\left(\frac{1}{2}x + \frac{5}{2}\right) - 5$

$= x + 5 - 5$

$= x \checkmark$

$g(f(x)) = \frac{1}{2}(2x - 5) + \frac{5}{2}$

$= x - \frac{5}{2} + \frac{5}{2}$

$= x \checkmark$

Given $f(x) = 3x - 2$ and $g(x) = x^2 - 4x + 4$, find each function.

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

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

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

$\boxed{-x^2 + 7x - 6}$

11.) $(fg)(x)$

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

$3x^3 - 12x^2 + 12x - 2x^2 - 8x - 8$

$\boxed{3x^3 - 14x^2 + 4x - 8}$