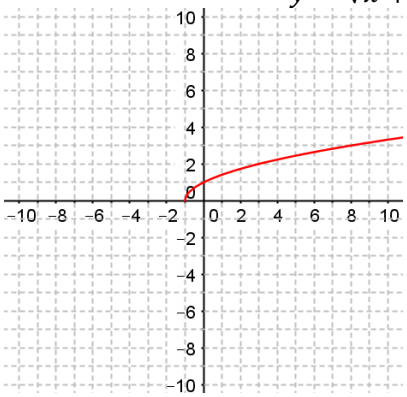
Name: _____

SM3 Unit 6 Review

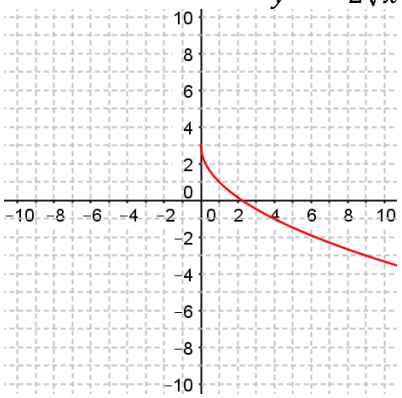
Graph each function and identify the indicated properties. Be sure to include the anchor points and the x- and y-intercepts (if applicable). Round to the nearest hundredth.

1) $y = \sqrt{x+1}$



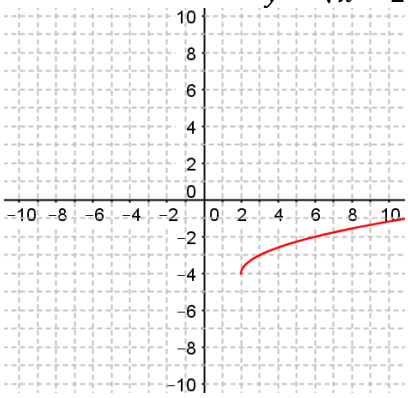
Domain:	$[-1, \infty)$
Range:	$[0, \infty)$
Max/Min:	$(-1, 0)$
x-intercept(s):	$(-1, 0)$
y-intercept:	$(0, 1)$
Increasing:	$[-1, \infty)$
Decreasing:	$\emptyset$
Positive:	$(-1, \infty)$
Negative:	$\emptyset$

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



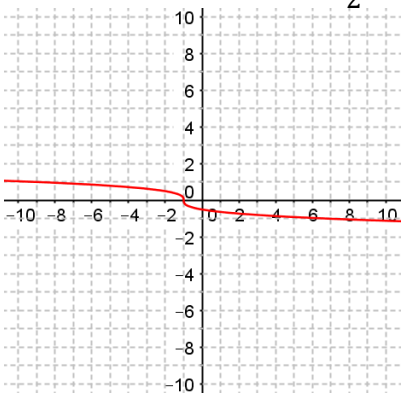
Domain:	$[0, \infty)$
Range:	$(-\infty, 3]$
Max/Min:	$(0, 3)$
x-intercept(s):	$\left(\frac{9}{4}, 0\right)$
y-intercept:	$(0, 3)$
Increasing:	$\emptyset$
Decreasing:	$[0, \infty)$
Positive:	$\left[0, \frac{9}{4}\right)$
Negative:	$\left(\frac{9}{4}, \infty\right)$

3) $y = \sqrt{x-2} - 4$



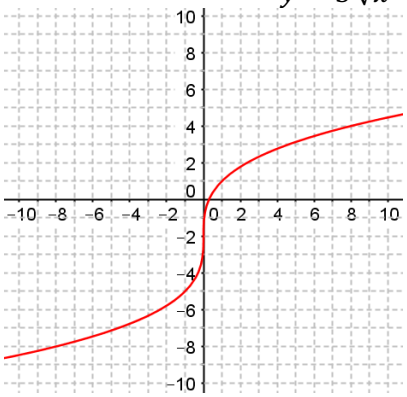
Domain:	$[2, \infty)$
Range:	$[-4, \infty)$
Max/Min:	$(2, -4)$
x-intercept(s):	$(18, 0)$
y-intercept:	$\emptyset$
Increasing:	$[2, \infty)$
Decreasing:	$\emptyset$
Positive:	$(18, \infty)$
Negative:	$[2, 18)$

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



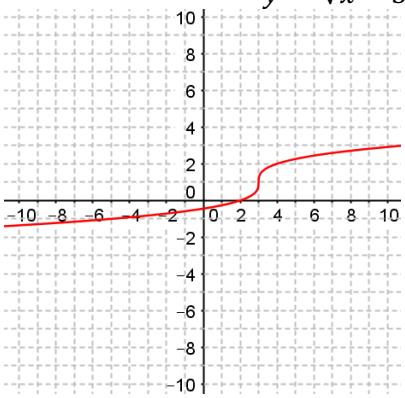
Domain:	$(-\infty, \infty)$
Range:	$(-\infty, \infty)$
Max/Min:	$\emptyset$
x-intercept(s):	$(-1, 0)$
y-intercept:	$\left(0, -\frac{1}{2}\right)$
Increasing:	$\emptyset$
Decreasing:	$(-\infty, \infty)$
Positive:	$(-\infty, -1)$
Negative:	$(-1, \infty)$

5) $y = 3\sqrt[3]{x} - 2$



Domain:	$(-\infty, \infty)$
Range:	$(-\infty, \infty)$
Max/Min:	$\emptyset$
x-intercept(s):	$\left(\frac{8}{27}, 0\right)$
y-intercept:	$(0, -2)$
Increasing:	$(-\infty, \infty)$
Decreasing:	$\emptyset$
Positive:	$\left(\frac{8}{27}, \infty\right)$
Negative:	$\left(-\infty, \frac{8}{27}\right)$

6) $y = \sqrt[3]{x-3} + 1$



Domain:	$(-\infty, \infty)$
Range:	$(-\infty, \infty)$
Max/Min:	$\emptyset$
x-intercept(s):	$(2, 0)$
y-intercept:	$\left(-\sqrt[3]{3} + 1, 0\right)$
Increasing:	$(-\infty, \infty)$
Decreasing:	$\emptyset$
Positive:	$(2, \infty)$
Negative:	$(-\infty, 2)$

Solve each equation for x over the set of real numbers. (Remember to check your solutions! I didn't show the check on the problems where it worked out.)

7) $\sqrt{x} = 7$

$\sqrt{x}^2 = 7^2$

$x = 49$

8) $\sqrt{x} = -2$

$\emptyset$

A square root cannot equal a negative number

9) $\sqrt{x} = \frac{1}{2}$

$\sqrt{x}^2 = \left(\frac{1}{2}\right)^2$

$x = \frac{1}{4}$

10) $\sqrt{7x} = 21$

$\sqrt{7x}^2 = 21^2$

$7x = 441$

$x = 63$

11) $\sqrt{20x} = -10$

$\emptyset$

A square root cannot equal a negative number

12) $15\sqrt{x} = 30$

$\sqrt{x} = 2$

$\sqrt{x}^2 = 2^2$

$x = 4$

13) $\sqrt{x^2 + 45} = x + 5$

$\sqrt{x^2 + 45}^2 = (x + 5)^2$

$x^2 + 45 = (x + 5)(x + 5)$

$x^2 + 45 = x^2 + 10x + 25$

$0 = 10x - 20$

$10x = 20$

$x = 2$

14) $\sqrt{2x - 1} = 11$

$\sqrt{2x - 1}^2 = 11^2$

$2x - 1 = 121$

$2x = 122$

$x = 61$

15) $\sqrt{5x - 1} - \sqrt{x + 3} = 0$

$\sqrt{5x - 1} = \sqrt{x + 3}$

$\sqrt{5x - 1}^2 = \sqrt{x + 3}^2$

$5x - 1 = x + 3$

$4x = 4$

$x = 1$

16) $x + 7 = \sqrt{13 - x}$

$(x + 7)^2 = \sqrt{13 - x}^2$

$(x + 7)(x + 7) = 13 - x$

$x^2 + 14x + 49 = 13 - x$

$x^2 + 15x + 36 = 0$

$(x + 3)(x + 12) = 0$

$x = -3, x = -12$

Check:

$-3 + 7$

$= \sqrt{13 - -3}$

$4 = \sqrt{16}$

$-12 + 7$

$= \sqrt{13 - -12}$

$-5 \neq \sqrt{25}$

Reject: $x = -12$

Answer: $x = -3$

17) $\sqrt{8x-3}=\sqrt{3x+7}$

$\left(\sqrt{8x-3}\right)^2=\left(\sqrt{3x+7}\right)^2$

$8x-3=3x+7$

$5x-3=7$

$5x=10$

$x=2$

18) $\sqrt[3]{x}-5=2$

$\sqrt[3]{x}=7$

$\left(\sqrt[3]{x}\right)^3=7^3$

$x=343$

19) $\sqrt[3]{x-5}=4$

$\left(\sqrt[3]{x-5}\right)^3=4^3$

$x-5=64$

$x=69$

20) $\sqrt[4]{x+6}=1$

$\left(\sqrt[4]{x+6}\right)^4=1^4$

$x+6=1$

$x=-5$

21) $2\sqrt[4]{x}=6$

$\sqrt[4]{x}=3$

$\left(\sqrt[4]{x}\right)^4=3^4$

$x=81$

22) $5\sqrt[3]{x+2}+1=-24$

$5\sqrt[3]{x+2}=-25$

$\sqrt[3]{x+2}=-5$

$\left(\sqrt[3]{x+2}\right)^3=(-5)^3$

$x+2=-125$

$x=-127$

23) $25\sqrt[6]{x-2}=75$

$\sqrt[6]{x-2}=3$

$\left(\sqrt[6]{x-2}\right)^6=3^6$

$x-2=729$

$x=731$

24) $x^{2/3}+3=39$

$x^{2/3}=36$

$\left(x^{2/3}\right)^{3/2}=\pm 36^{3/2}$

$x=\pm 216$

25) $5x^{2/5}-1=44$

$5x^{2/5}=45$

$x^{2/5}=9$

$\left(x^{2/5}\right)^{5/2}=\pm 9^{5/2}$

$x=\pm 243$

26) $x^{3/2}=-8$

$\emptyset$

$x^{3/2}=\sqrt{x^3}$, and a square root cannot equal a negative number

27) $(x+1)^{4/5}=16$

$\left((x+1)^{4/5}\right)^{5/4}=\pm 16^{5/4}$

$x+1=\pm 32$

$x=31\ or\ -33$

28) $(12x+8)^{3/7}=8$

$\left((12x+8)^{3/7}\right)^{7/3}=8^{7/3}$

$12x+8=128$

$12x=120$

$x=10$

Find the composition of each function.

29) If $f(x)=-4x+9$ and $g(x)=2x-7$, find $(f\circ g)(x)$

$-4(2x-7)+9$

$-8x+28+9$

$-8x+37$

30) If $f(x)=-4x+9$ and $g(x)=2x-7$, find $(g\circ f)(x)$

$2(-4x+9)-7$

$-8x+18-7$

$-8x+11$

31) If $h(x) = 3x - 5$ and $k(x) = 2x^2 - 7x$, find $(h \circ k)(x)$

$3(2x^2 - 7x) - 5$

$6x^2 - 21x - 5$

32) If $h(x) = 3x - 5$ and $k(x) = 2x^2 - 7x$, find $(k \circ h)(x)$

$2(3x - 5)^2 - 7(3x - 5)$

$2(3x - 5)(3x - 5) - 7(3x - 5)$

$2(9x^2 - 15x - 15x + 25) - 7(3x - 5)$

$18x^2 - 30x - 30x + 50 - 21x + 35$

$18x^2 - 81x + 85$

33) Find $(h \circ k)(3)$

$h(k(3))$:

$k(3) = 2(3)^2 - 7(3) = -3$

$h(k(3)) = h(-3)$

$h(-3) = 3(-3) - 5 = -14$

34) Find $(k \circ h)(-3)$

$k(h(-3))$:

$h(-3) = 3(-3) - 5 = -14$

$k(h(-3)) = k(-14)$

$k(-14) = 2(-14)^2 - 7(-14) = 490$

If $f(x) = \{(-2, -4), (-1, -2), (0,0), (1, 2)\}$ and $g(x) = \{(-4, -11), (-2, -5), (0, 1), (2, 7)\}$

35) Find $(g \circ f)(-2)$

$g(f(-2)) = g(-4) = -11$

36) Find $(f \circ g)(0)$

$f(g(0)) = f(1) = 2$

For problems 35-36, a) Tell if the relation is a function, b) If it is a function, tell if it is one-to-one, c) Find the inverse of the relation, and d) Tell if the inverse is a function.

37) $\{(6, 5), (-3, 2), (0, 3)\}$

a)	Function?	yes
b)	One-to-one?	yes
c)	Inverse	$\{(5, 6), (2, -3), (3,0)\}$
d)	Inverse Function?	yes

38) $\{(3, 1), (-7, -6), (0, 5), (8, -6\}$

a)	Function?	yes
b)	One-to-one?	no
c)	Inverse:	$\{(1,3), (-6, -7), (5,0), (-6,8)\}$
d)	Inverse Function?	no

Find the inverse of each function (restrict the domain as necessary).

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

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

$x + 6 = \frac{2}{3}y$

$\frac{3}{2}(x + 6) = y$

$y^{-1} = \frac{3}{2}x + 9$

40) $f(x) = x^2 - 3$

Not one-to-one, restrict the domain $x \geq 0$

$x = y^2 - 3$

$x + 3 = y^2$

$\sqrt{x + 3} = y$

$f^{-1}(x) = \sqrt{x + 3}$

41) $g(x) = (x-2)^2 + 1$

Not one-to-one, restrict domain $x \geq 2$

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

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

$\sqrt{x-1} = y - 2$

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

$g^{-1}(x) = \sqrt{x-1} + 2$

42) $g(x) = 2\sqrt{x+1} - 4$

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

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

$\frac{x+4}{2} = \sqrt{y+1}$

$\left(\frac{(x+4)}{2}\right)^2 = y + 1$

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

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