Answers to Odd Problems

Chapter 4

Section 4.1

1) x^5
3) a^4
5) 2^5 or 32
7) x^6
9) x^3
11) $\frac{1}{b^2}$
13) 2
15) $\frac{1}{2^3}$ *or* $\frac{1}{8}$
17) x^6
19) z^9
21) x^2y^6
23) $8x^6y^3$
25) $-27x^6y^3$
27) $\frac{y}{x}$
29) $\frac{1}{x^2}$
31) $24a^4b^{11}$
33) $225p^8q^6$
35) $\frac{2}{xy^4}$
37) $\frac{x^8}{16}$
39) $\frac{8x^3}{y^6}$
41) $\frac{125x^3y^6}{8z^3}$

Section 4.2

1) 1
3) 1
5) -1
7) 1
9) 2
11) 1
13) $\frac{1}{9}$
15) $\frac{1}{x^5}$
17) a^3
19) $2x^3$
21) $\frac{2}{y^5}$
23) $\frac{3x}{y^2}$
25) $\frac{81}{16}$
27) $\frac{9y^2}{4x^4}$
29) $\frac{1}{x^2}$
31) $\frac{1}{x^3}$
33) x
35) $\frac{1}{x^8}$
37) $\frac{1}{7x^7y^2}$

Section 4.3

1) 7
3) -9
5) 15
7) 2
9) -2
11) 2
13) 1
15) $\frac{3}{4}$
17) $\frac{1}{2}$
19) 2
21) 6
23) -2
25) -2
27) 20
29) 6
31) 3.8730
33) 3.4641
35) 4.2543
37) 1.7783
39) 12.2170
41) -11.2288
43a) 3
43b) 3
43c) $|x|$
45a) 4
45b) -4
45c) x
47) $|a|$
49) y
51) $|a|$
53) y
55) 5x
57) x^3
59) z^4
61) x^2
63) $4z^5$
65) $4x^4$
67) y^5
69) $\frac{8}{y^4}$
71) $\frac{2x^3y^4}{z^5}$
73) $\frac{3}{4x}$
75) $\frac{5x^3}{4z^2}$
77) $\frac{1}{7x}$

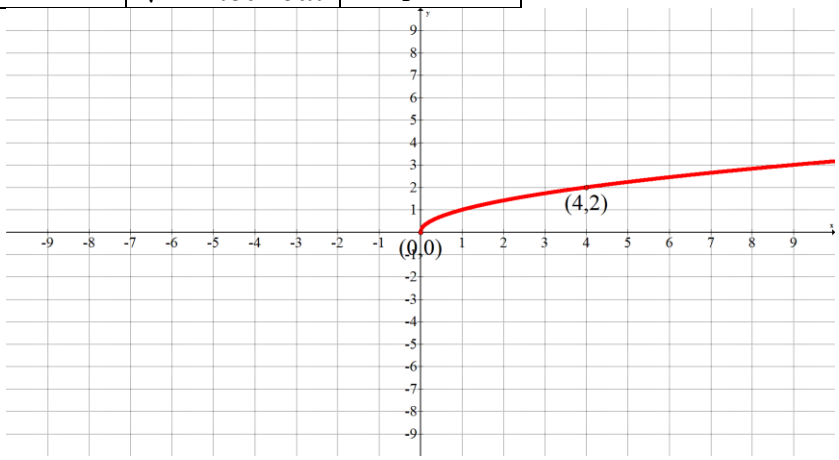
Answers to Odd Problems

Section 4.3

79) Use a calculator to complete the table, round to two decimal places when needed. Sketch a graph of the function and find the domain and range of the function in interval notation.

Let $h(x) = \sqrt{x}$

x	h(x)	point
4	$\sqrt{4} = 2$	(4,2)
3	$\sqrt{3} = 1.73$	(3,1.73)
2	$\sqrt{2} = 1.41$	(2, 1.41)
1	$\sqrt{1} = 1$	(1,1)
0	$\sqrt{0} = 0$	(0,0)
-1	$\sqrt{-1}\ not\ real$	No point
-2	$\sqrt{-2}\ not\ real$	No point



Domain: The x-coordinate of the far right point is 0. The graph extends to the far right end of the x-axis so the domain is: $[0, \infty)$

Range: The y-coordinate of the bottom point is 0. The graph extends to the top of the y-axis, so the range is also $[0, \infty)$

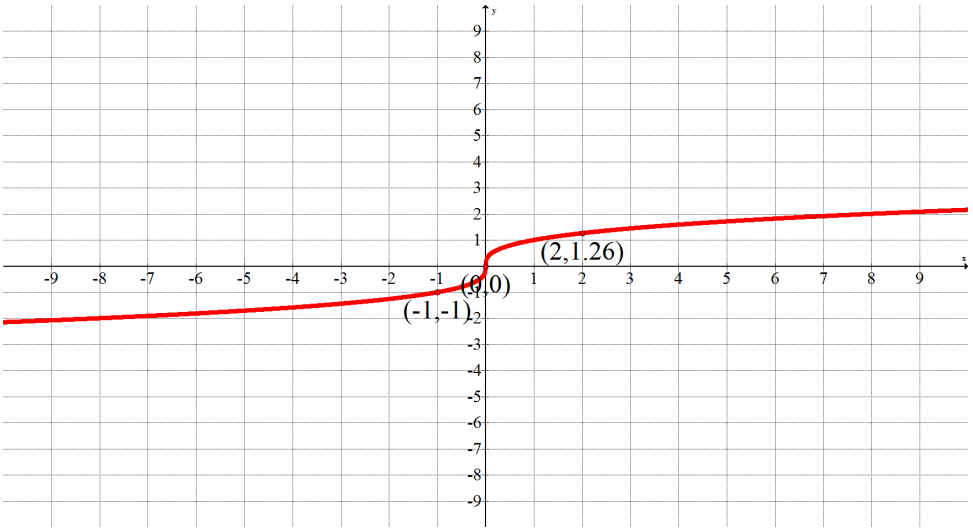
Answers to Odd Problems

Section 4.3

81) Use a calculator to complete the table, round to two decimal places when needed. Sketch a graph of the function and find the domain and range of the function in interval notation.

Let $h(x) = \sqrt[3]{x}$

x	h(x)	point
4	$\sqrt[3]{4} = 1.59$	(4,1.59)
3	$\sqrt[3]{3} = 1.44$	(3,1.44)
2	$\sqrt[3]{2} = 1.26$	(2,1.26)
1	$\sqrt[3]{1} = 1$	(1,1)
.5	$\sqrt[3]{.5} = .79$	(.5, .79)
0	$\sqrt[3]{0} = 0$	(0,0)
-.5	$\sqrt[3]{-.5} = -.79$	(.5, -.79)
-1	$\sqrt[3]{-1} = -1$	(-1,-1)
-2	$\sqrt[3]{-2} = -1.26$	(-2,-1.26)



Domain: The graph extends to the far left edge of the x-axis and to the far right edge of the x-axis. The domain is $(-\infty, \infty)$

Range: The graph extends to the bottom of the y-axis and to the top of the y-axis. The range is $(-\infty, \infty)$

Answers to Odd Problems

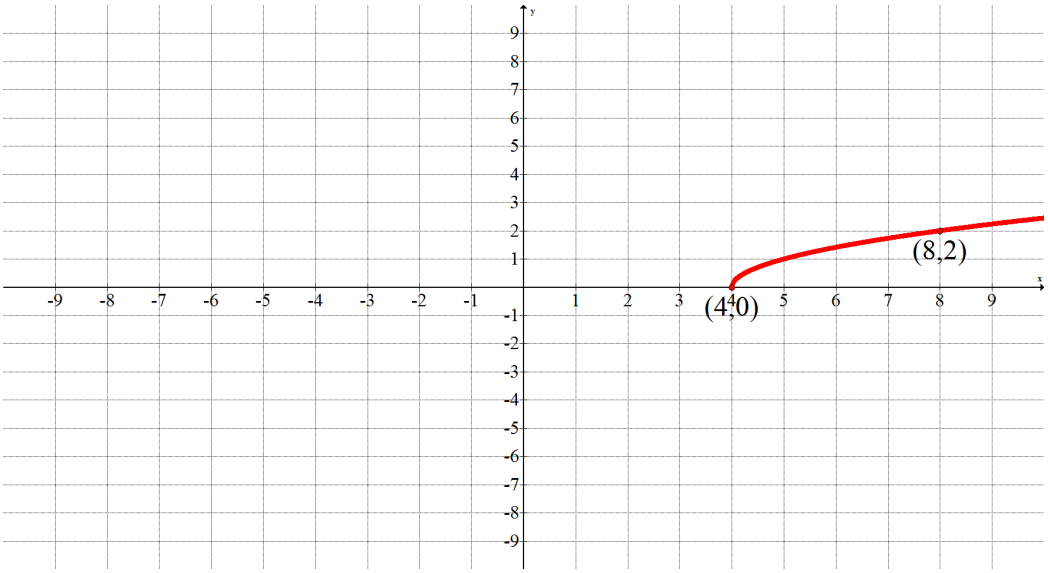
Section 4.3

83) a) $f(x) = \sqrt{x-4}$

First I will find the domain.
$x - 4 \geq 0$ (add 4 to each side to get the domain)
Domain $x \geq 4$ which also can be written as $[4, \infty)$

This tells me I only need numbers that are 4 or larger in my table.

x	h(x)	point
4	$\sqrt{4-4} = 0$	(4,0)
5	$\sqrt{5-4} = 1$	(5,1)
6	$\sqrt{6-4} = 1.41$	(6, 1.41)
7	$\sqrt{7-4} = 1.73$	(7,1.73)
8	$\sqrt{8-4} = 2$	(8,2)



I know the domain is $[4, \infty)$
I can find the range from the graph. The y-coordinate of the bottom point is y=0. The graph extends to the top of the y-axis. The range is $[0, \infty)$

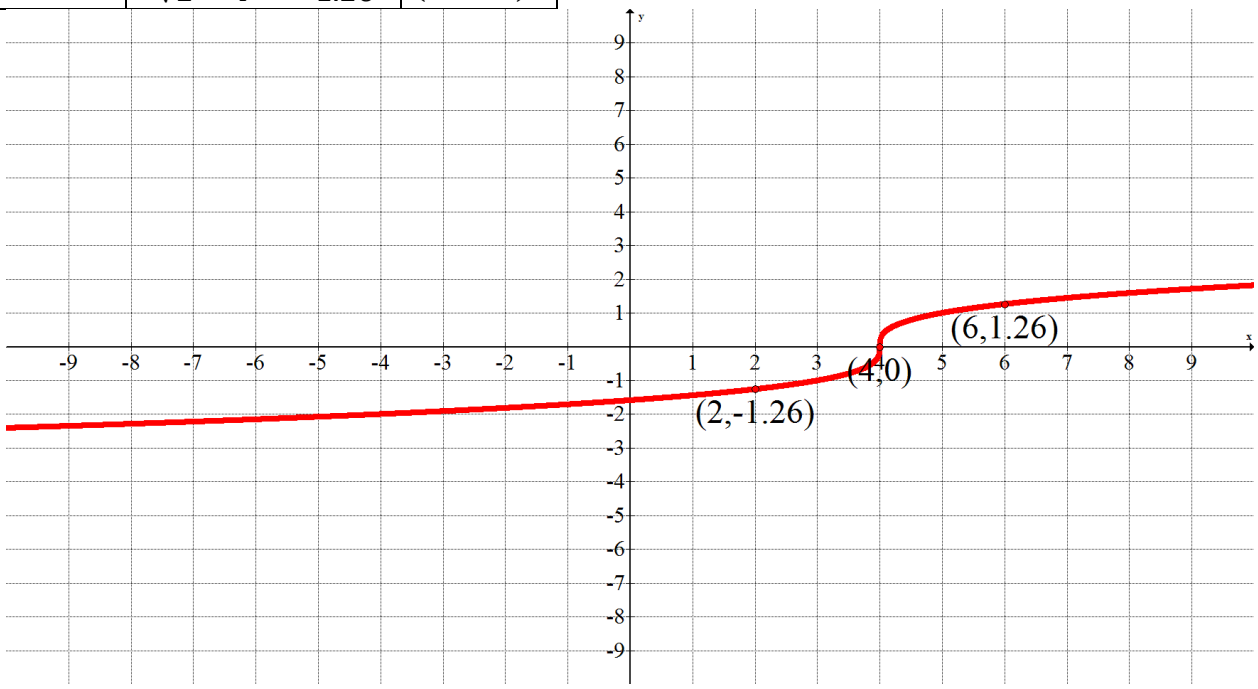
Answers to Odd Problems

Section 4.3

83 b) $f(x) = \sqrt[3]{x-4}$

I will build a table with 4 in the middle, and put a few numbers larger and smaller than 4 in the x-column. The number that I use in the start of my domain table of a square root will be in the middle of my tables for my cube root graphs.

x	h(x)	point
6	$\sqrt[3]{6-4} = 1.26$	(6,1.26)
5	$\sqrt[3]{5-4} = 1$	(5,1)
4	$\sqrt[3]{4-4} = 0$	(4,0)
3	$\sqrt[3]{3-4} = -1$	(3,-1)
2	$\sqrt[3]{2-4} = -1.26$	(2,-1.26)



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Range: The graph extends to the bottom of the y-axis and to the top of the y-axis. The range is $(-\infty, \infty)$

Answers to Odd Problems

Section 4.3

85) a) $f(x) = \sqrt{x+4}$

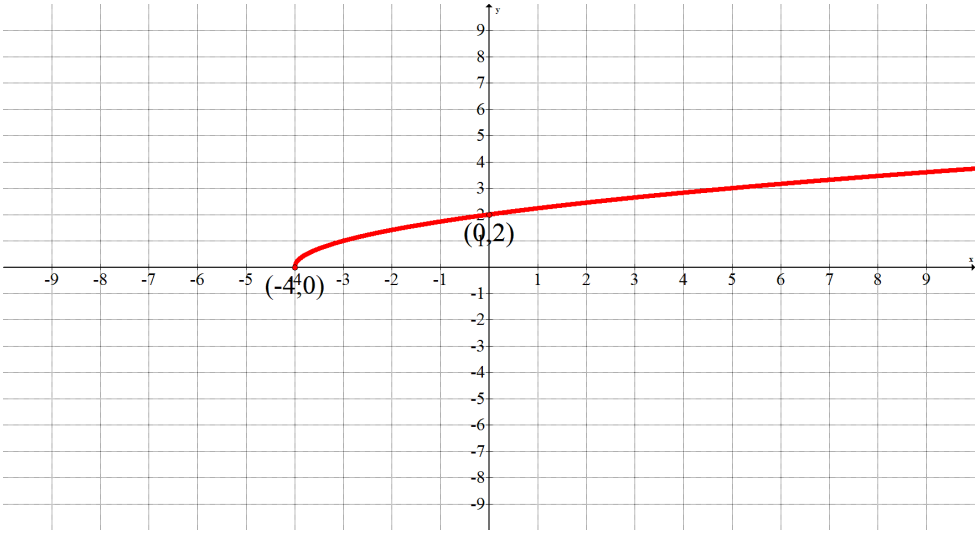
First I will find the domain.

$x + 4 \geq 0$ (subtract 4 from each side to get the domain)

Domain $x \geq -4$ which also can be written as $[-4, \infty)$

This tells me I only need numbers that are -4 or larger in my table.

x	h(x)	point
-4	$\sqrt{-4+4} = 0$	(-4,0)
-3	$\sqrt{-3+4} = 1$	(-3,1)
-2	$\sqrt{-2+4} = 1.41$	(-2, 1.41)
-1	$\sqrt{-1+4} = 1.73$	(-1,1.73)
0	$\sqrt{0+4} = 2$	(0,2)



I know the domain is $[-4, \infty)$

I can find the range from the graph. The y-coordinate of the bottom point is y=0. The graph extends to the top of the y-axis. The range is $[0, \infty)$

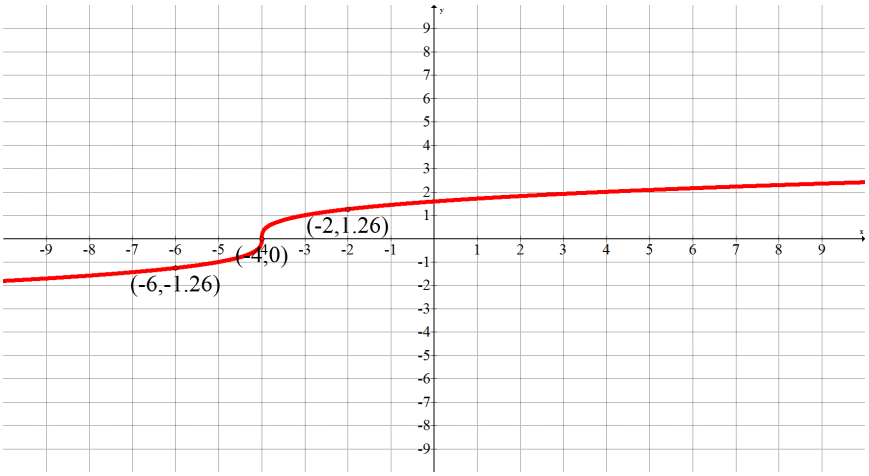
Answers to Odd Problems

Section 4.3

85 b) $f(x) = \sqrt[3]{x+4}$

I will build a table with -4 in the middle, and put a few numbers larger and smaller than -4 in the x-column. The number that I use in the start of my domain table of a square root will be in the middle of my tables for my cube root graphs.

x	h(x)	point
-2	$\sqrt[3]{-2+4} = 1.26$	(-2,1.26)
-3	$\sqrt[3]{-3+4} = 1$	(-3,1)
-4	$\sqrt[3]{-4+4} = 0$	(-4,0)
-5	$\sqrt[3]{-5+4} = -1$	(-5,-1)
-6	$\sqrt[3]{-6+4} = -1.26$	(-6,-1.26)



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Range: The graph extends to the bottom of the y-axis and to the top of the y-axis. The range is $(-\infty, \infty)$

Answers to Odd Problems

Section 4.3

87) a) $f(x) = \sqrt{x-4} + 3$

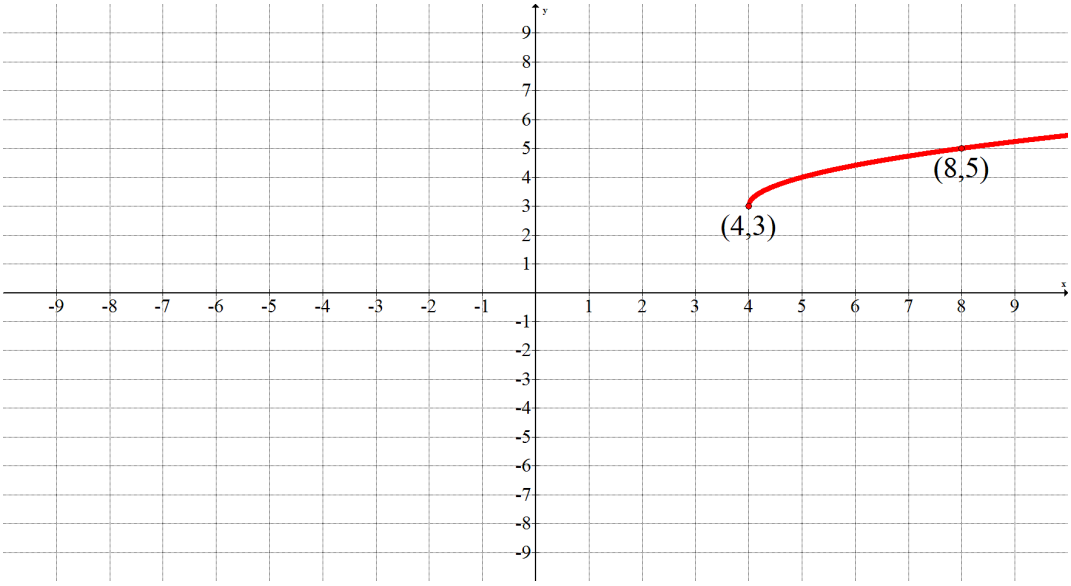
First I will find the domain.

$x - 4 \geq 0$ (add 4 to each side to get the domain)

Domain $x \geq 4$ which also can be written as $[4, \infty)$

This tells me I only need numbers that are 4 or larger in my table.

x	h(x)	point
4	$\sqrt{4-4} + 3 = 3$	(4,3)
5	$\sqrt{5-4} + 3 = 4$	(5,4)
6	$\sqrt{6-4} + 3 = 4.41$	(6, 4.41)
7	$\sqrt{7-4} + 3 = 4.73$	(7,4.73)
8	$\sqrt{8-4} + 3 = 5$	(8,5)



I know the domain is $[4, \infty)$

I can find the range from the graph. The y-coordinate of the bottom point is y=3. The graph extends to the top of the y-axis. The range is $[3, \infty)$

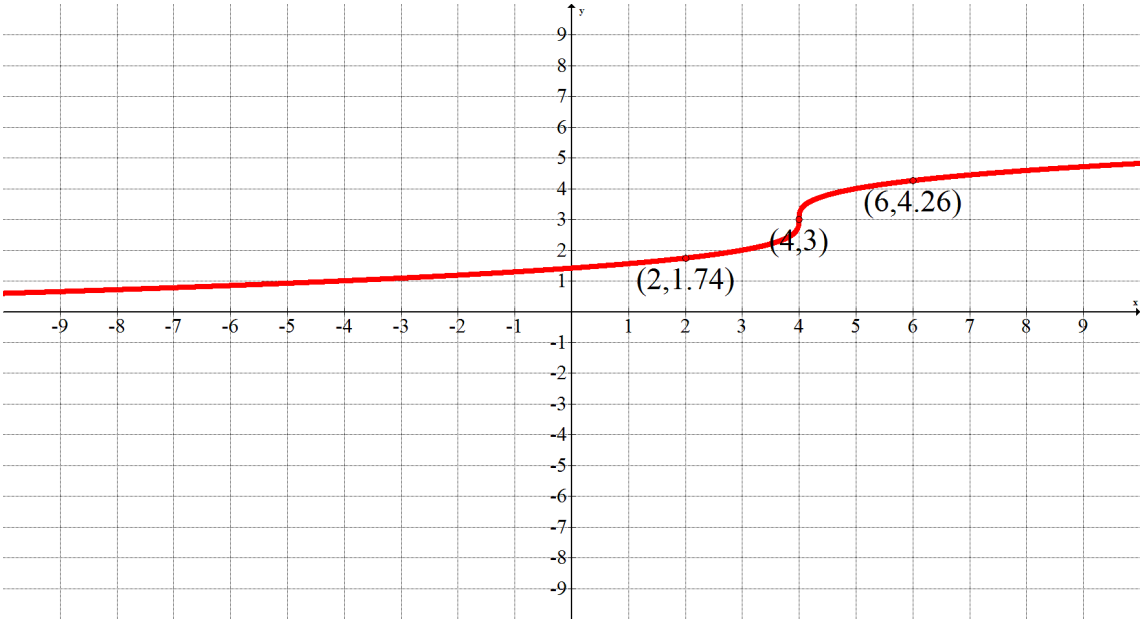
Answers to Odd Problems

Section 4.3

87) b) $f(x) = \sqrt[3]{x-4} + 1$

I will build a table with 4 in the middle, and put a few numbers larger and smaller than 4 in the x-column. The number that I use in the start of my domain table of a square root will be in the middle of my tables for my cube root graphs.

x	h(x)	point
6	$\sqrt[3]{6-4} + 3 = 4.26$	(6,4.26)
5	$\sqrt[3]{5-4} + 3 = 4$	(5,1)
4	$\sqrt[3]{4-4} + 3 = 3$	(4,0)
3	$\sqrt[3]{3-4} + 3 = 2$	(3,-1)
2	$\sqrt[3]{2-4} + 3 = 1.74$	(2,1.74)



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Range: The graph extends to the bottom of the y-axis and to the top of the y-axis. The range is $(-\infty, \infty)$

Answers to Odd Problems

Section 4.3

89) a) $f(x) = \sqrt{x+4} + 2$

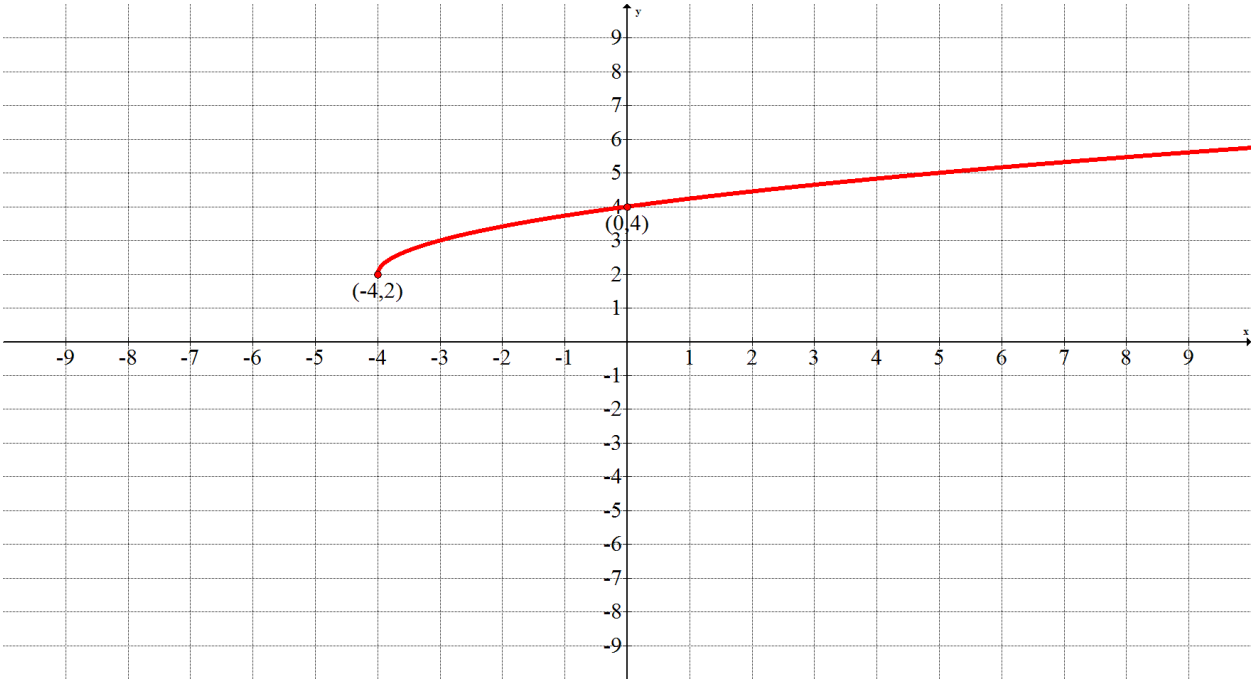
First I will find the domain.

$x + 4 \geq 0$ (subtract 4 from each side to get the domain)

Domain $x \geq -4$ which also can be written as $[-4, \infty)$

This tells me I only need numbers that are -4 or larger in my table.

x	h(x)	point
-4	$\sqrt{-4+4} + 2 = 2$	(-4,2)
-3	$\sqrt{-3+4} + 2 = 3$	(-3,3)
-2	$\sqrt{-2+4} + 2 = 3.41$	(-2, 3.41)
-1	$\sqrt{-1+4} + 2 = 3.73$	(-1,3.73)
0	$\sqrt{0+4} + 2 = 4$	(0,4)



I know the domain is $[-4, \infty)$

I can find the range from the graph. The y-coordinate of the bottom point is y=2. The graph extends to the top of the y-axis. The range is $[2, \infty)$

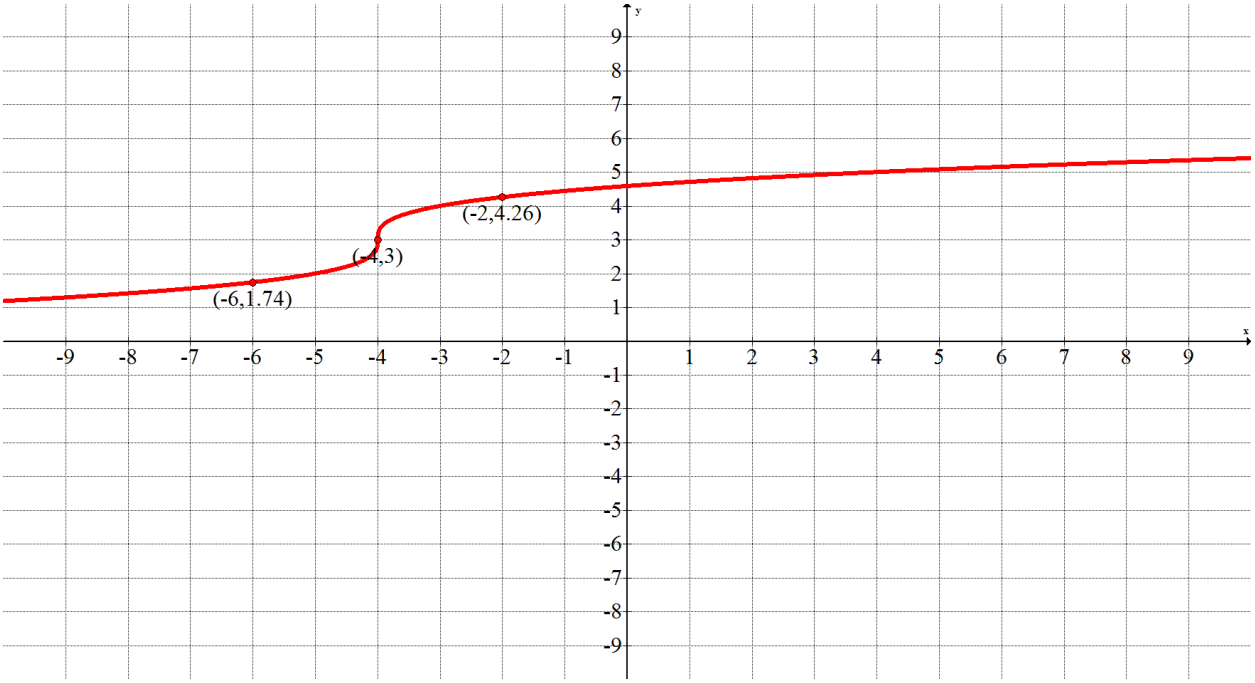
Answers to Odd Problems

Section 4.3

89 b) $f(x) = \sqrt[3]{x+4} + 3$

I will build a table with -4 in the middle, and put a few numbers larger and smaller than -4 in the x-column. The number that I use in the start of my domain table of a square root will be in the middle of my tables for my cube root graphs.

x	h(x)	point
-2	$\sqrt[3]{-2+4} + 3 = 4.26$	(-2,4.26)
-3	$\sqrt[3]{-3+4} + 3 = 4$	(-3,4)
-4	$\sqrt[3]{-4+4} + 3 = 3$	(-4,3)
-5	$\sqrt[3]{-5+4} + 3 = 2$	(-5,2)
-6	$\sqrt[3]{-6+4} + 3 = 1.74$	(-6,1.74)



Domain: The graph extends to the far left edge of the x-axis and to the far right edge of the x-axis. The domain is $(-\infty, \infty)$

Range: The graph extends to the bottom of the y-axis and to the top of the y-axis. The range is $(-\infty, \infty)$

Answers to Odd Problems

Section 4.3

91) a) $f(x) = \sqrt{2x-6} + 1$

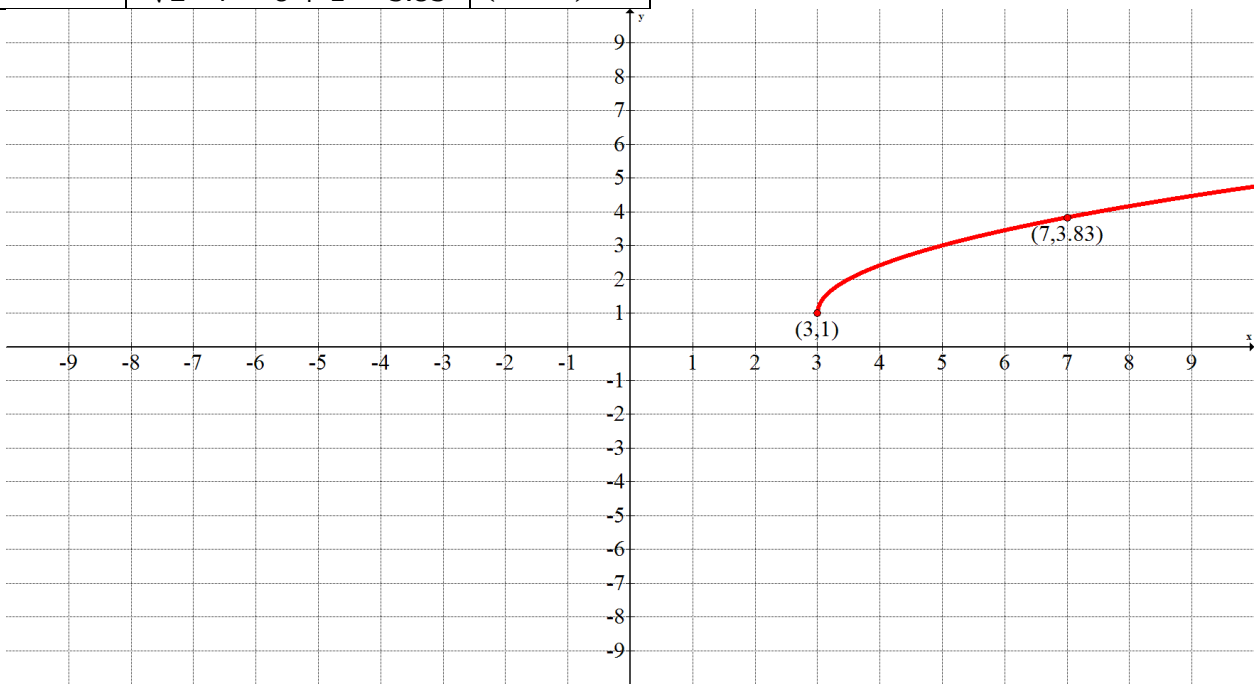
First I will find the domain.

$2x - 6 \geq 0$ (add 6 to each side, then divide by two to get the domain)

Domain $x \geq 3$ which also can be written as $[3, \infty)$

This tells me I only need numbers that are 3 or larger in my table.

x	h(x)	point
3	$\sqrt{2*3-6}+1=1$	(3,1)
4	$\sqrt{2*4-6}+1=2.41$	(4,2.41)
5	$\sqrt{2*5-6}+1=3$	(5,3)
6	$\sqrt{2*6-6}+1=2.64$	(6,2.64)
7	$\sqrt{2*7-6}+1=3.83$	(7,3.83)



I know the domain is $[3, \infty)$

I can find the range from the graph. The y-coordinate of the bottom point is y=1. The graph extends to the top of the y-axis. The range is $[1, \infty)$

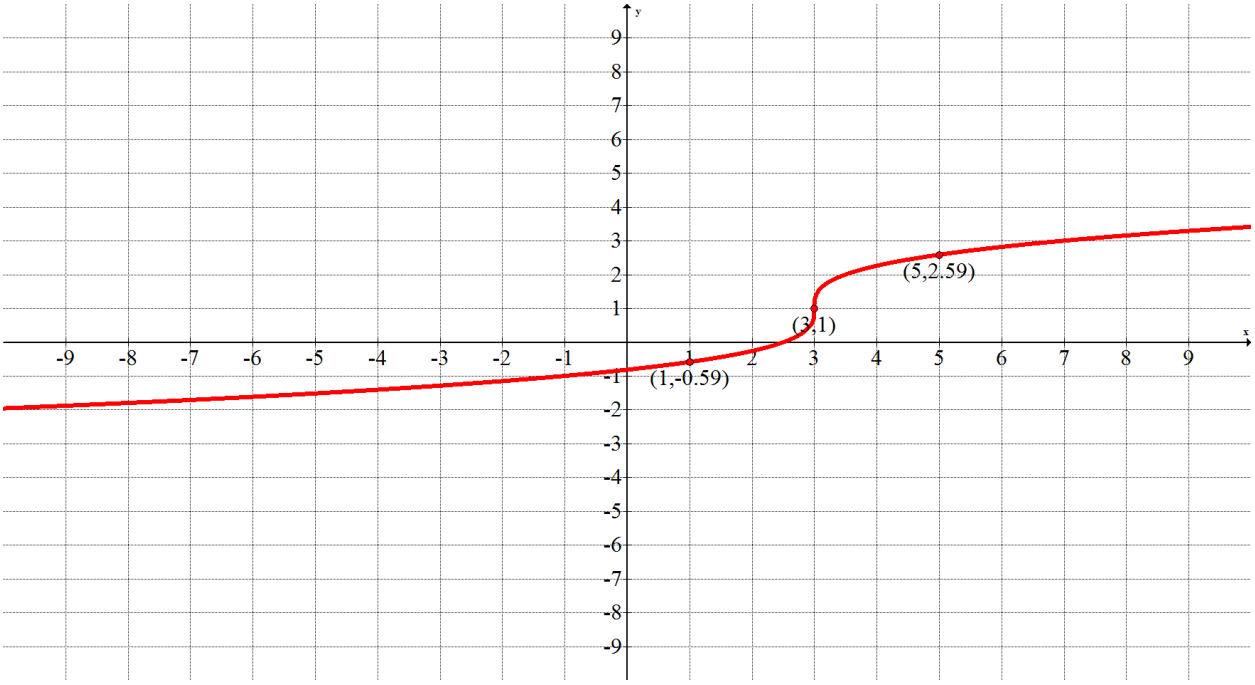
Answers to Odd Problems

Section 4.3

91) b) $f(x) = \sqrt[3]{2x-6}+1$

I will build a table with 3 in the middle, and put a few numbers larger and smaller than 3 in the x-column. The number that I use in the start of my domain table of a square root will be in the middle of my tables for my cube root graphs.

x	h(x)	point
5	$\sqrt[3]{2*5-6}+1=2.59$	(5,2.59)
4	$\sqrt[3]{2*4-6}+1=2.26$	(4,2.26)
3	$\sqrt[3]{2*3-6}+1=1$	(3,1)
2	$\sqrt[3]{2*2-6}+1=-0.26$	(2,-0.26)
1	$\sqrt[3]{2*1-6}+=-0.59$	(1, -0.59)



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Range: The graph extends to the bottom of the y-axis and to the top of the y-axis. The range is $(-\infty, \infty)$

Answers to Odd Problems

Section 4.4

1) $\sqrt[5]{3^2}$ 3) $\sqrt{2x}$ 5) $\sqrt[3]{\left(\frac{5}{2y}\right)^2}$

7) $x^{1/3}$ 9) $3x^{1/2}$ 11) $(5a^3)^{1/2}$

13) $\sqrt{81} = 9$ 15) $-\sqrt{16} = -4$ 17) $\sqrt[3]{27^2} = 9$

19) $\frac{1}{\sqrt{9}} = \frac{1}{3}$ 21) $\frac{1}{\sqrt[5]{32^2}} = \frac{1}{4}$ 23) $\frac{1}{3}$

25) $\frac{1}{1000}$ 27) $\sqrt{\left(\frac{4}{9}\right)^3} = \frac{8}{27}$ 29) $\sqrt{\left(\frac{49}{25}\right)^3} = \frac{343}{125}$

31) $2^4 = 16$ 33) $\frac{1}{x^2}$ 35) 16x

37) $\frac{1}{512}$ 39) $\frac{5}{x}$ 41) $\frac{1}{x^{1/6}}$

43) $\frac{1}{a^{1/6}} or \frac{1}{\sqrt[6]{a}}$ 45) 1.7321 47) 0.1170

49) 6.2403 51) 1.2510

Section 4.5

1) $\sqrt{16x^2} = 4x$ 3) $\sqrt[3]{a^9b^6} = a^3b^2$ 5) 2x

7) $6x^2$ 9) $\sqrt{4x^2} = 2x$

11) $\sqrt[3]{\frac{8}{x^3}} = \frac{2}{x}$ 13) $2x^2$ 15) $\frac{1}{x^2}$

17) $5\sqrt{2}$ 19) $3\sqrt{6}$ 21) $6\sqrt{7}$

23) $2\sqrt[3]{3}$ 25) $5\sqrt[3]{4}$ 27) $6\sqrt[4]{6}$

29) $x^2\sqrt{x}$ 31) $a^2\sqrt[3]{a}$ 33) $x^2\sqrt[4]{x^2}$

Section 4.5

35) $\sqrt[3]{x}$ (can 't be reduced) 37) $\sqrt[4]{y^2}$ (can't be reduced) 39) x^3

41) y^5 43) $5b^2\sqrt{2a}$ 45) $2x^2\sqrt[3]{6y^2z}$

47) $16y\sqrt{2xy}$ 49) $\frac{\sqrt{x}}{4y}$ 51) $\frac{3y\sqrt[3]{3xy^2}}{2}$

Section 4.6

1) $12\sqrt{3}$ 3) $2\sqrt[3]{4}$ 5) $-2\sqrt{6}$

7) $\sqrt{x} + 6\sqrt{2}$ 9) $7x\sqrt{x}$ 11) $-\frac{1}{6}x\sqrt{2x}$

13) $10\sqrt{2}$ 15) $\sqrt[3]{3}$ 17) $3x\sqrt{x}$

19) $7x\sqrt{xy}$ 21) $5\sqrt[3]{x}$ 23) $3\sqrt[3]{2}$

25) $4x\sqrt[3]{x^2}$ 27) $-2x\sqrt{x}$

Answers to Odd Problems

Section 4.7

1) 6
3) $3\sqrt{14}$
5) $2b^2\sqrt[4]{15}$
7) $30\sqrt{6}$
9) $20a^2\sqrt[3]{15a^2}$
11) $2\sqrt{10}+15\sqrt{2}$
13) $12-30\sqrt{2}$
15) $7+3\sqrt{3}$
17) $41+10\sqrt{35}$
19) $x-3\sqrt{x}-10$
21) $5\sqrt[3]{4}+9\sqrt[3]{2}-18$
23) $9\sqrt{2}+8\sqrt{3}-8\sqrt{6}-48$
25) $6+5\sqrt{x}-8x+2x\sqrt{x}$
27) 23
29) x^2-7
31) -43
33) $15+6\sqrt{6}$
35) $9-12\sqrt{x}+4x$

Section 4.8

1) $\frac{3\sqrt{5}}{5}$
3) $\frac{2\sqrt{6}}{3}$
5) $\frac{2\sqrt{3x}}{3x}$
7) $\frac{2\sqrt{3b}}{b}$
9) $\sqrt{a}$
11) $\frac{2\sqrt{2x}}{x^2}$
13) $\frac{3\sqrt{a}}{a^4}$
15) $\frac{2\sqrt[3]{25}}{5}$
17) $2\sqrt[3]{2}$
19) $\frac{2\sqrt[3]{x^2}}{x}$
21) $\frac{\sqrt[4]{8}}{2}$
23) $\frac{5(3-\sqrt{2})}{7}$
25) $-2(\sqrt{2}+\sqrt{3})$
27) $2\sqrt{3}+3$
29) $\frac{5(\sqrt{x}-\sqrt{y})}{x-y}$
31) $\frac{13+7\sqrt{3}}{22}$
33) $\frac{7+3\sqrt{5}}{2}$

Section 4.9

1) x= 16
3) x = 79
5) x = 18
7) b = 5
9) x = 64
11) x = 108
13) x = 126
15) x = 7
17) x = 6
19) n = -3
21) x = 36
23) z = 1
25) x = 6
27) x = -31
29) x = 16
31) x = 8
33) x = 9
35) x = 25
37) x = 6 (x = -3 is extraneous)
39) x = 2 (x = -1 is extraneous)
41) x = 7 (x = 2 is extraneous)
43) x = 5 (x = 1 is extraneous)
45) x = 6 (x = -3 is extraneous)
45) t = 9
47) t = 16
49) b = 4

Section 4.10

1) 4i
3) 27i
5) $2\sqrt{10}i$
7) -12
9) -6
11) $-5\sqrt{2}$
13) 2
15) $2\sqrt{3}$
17) $-1+\frac{1}{2}i$
19) $-6-\frac{5\sqrt{2}}{2}i$
21) $\frac{-3}{10}+\frac{\sqrt{10}}{5}i$
23) $\frac{7+10i}{2}$ or $\frac{7}{2}+5i$
25) -3 + i
27) $-2+\frac{\sqrt{26}}{2}i$
29) $-1-\frac{\sqrt{10}}{5}i$
31) $-6+\sqrt{3}i$