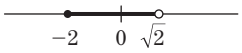
Instructor Answers

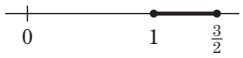
CHAPTER 0

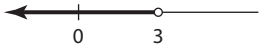
Exercises 0.1, page 9

1. 

2. 

3. 

4. 

5. 

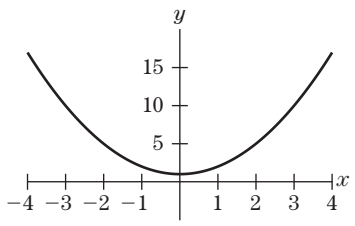
6. 

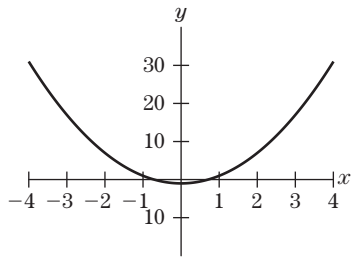
7. $[2, 3)$ **8.** $(-1, \frac{3}{2})$ **9.** $[-1, 0)$ **10.** $[-1, 8)$ **11.** $(-\infty, 3)$

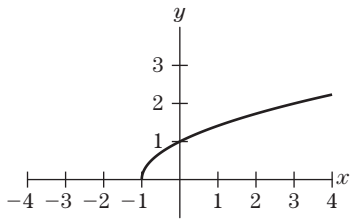
12. $[\sqrt{2}, \infty)$ **13.** $f(0) = 0, f(5) = 10, f(3) = 0, f(-7) = 70$ **14.** $0, 0, -\frac{9}{8}, a^3 + a^2 - a - 1$ **15.** $a^2 - 1, a^2 + 2a$

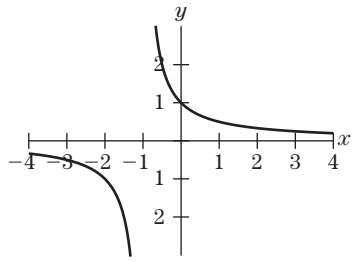
16. $\frac{1}{3}, 3, \dfrac{a+1}{a+2}$ **17.** 3 **18.** $h + 2$ **19. (a)** 5660 **(b)** 10220 **20. (a)** Number of laptop computers sold in 2015

(b) $f(5) = 185$ **21.** $x \neq 1, 2$ **22.** $t > 0\ (0, \infty)$ **23.** $x < 3$ **24.** $x \neq 0, x \neq -2\ (-\infty, -2) \cup (-2, 0) \cup (0, \infty)$

25.


26.


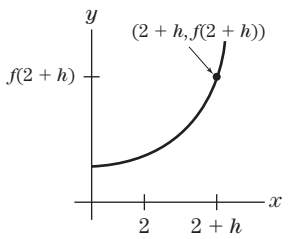
27.


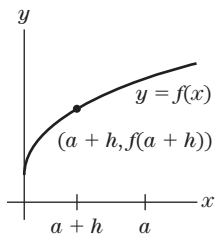
28.


29. Function **30.** Not a function **31.** Not a function **32.** Not a function **33.** Not a function **34.** Function
35. $f(0) = 1, f(7) = -1$ **36.** $f(2) = 3, f(-1) = 0$ **37.** Positive **38.** Negative **39.** $[-1, 3]$ **40.** $-1, 5, 9$
41. $(-\infty, -1], [5, 9]$ **42.** $[-1, 5], [9, \infty)$ **43.** $f(1) \approx .03, f(5) \approx .037$ **44.** $f(6) \approx .03$ **45.** $[0, .05]$ **46.** $t \approx 3$
47. No **48.** No **49.** Yes **50.** No **51.** $(a + 1)^3$ **52.** $y = \frac{5}{2 + h} - (2 + h)$ **53.** $1, 3, 4$
54. $f(1) = 1, f(2) = \frac{1}{2}, f(3) = 9$ **55.** $\pi, 3, 12$ **56.** $f(1) = 1, f(2) = 4, f(3) = 2$

57. $f(x) = \begin{cases} .06x & \text{for } 50 \leq x \leq 3000 \\ .02x + 15 & \text{for } 3000 < x \end{cases}$

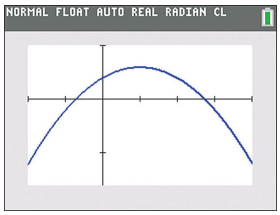
$f(3000) = .06(3000) = 180$, $f(4500) = .02(4500) + 15 = 105$. So \$180 and \$105

58.


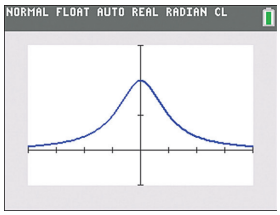
59.


60. (a) $200/3$ **(b)** $350/3$ **61.** You need parentheses $Y_1 = 1/(X + 1)$. **62.** You need parentheses $Y_1 = X\hat{}(3/4)$.

63.

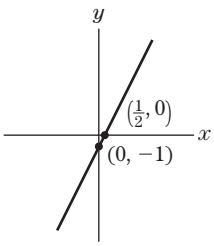


64.

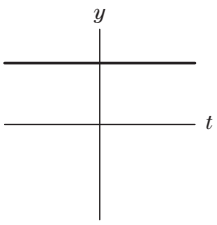


Exercises 0.2, page 18

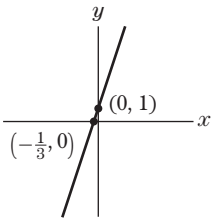
1.



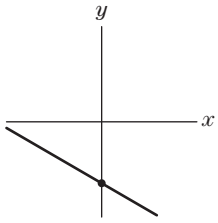
2



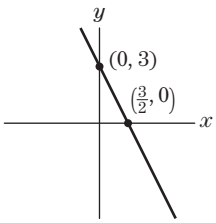
3.



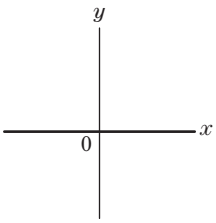
4.



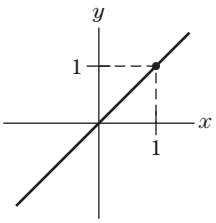
5.



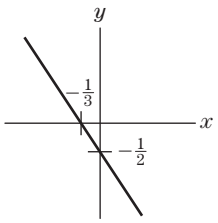
6.



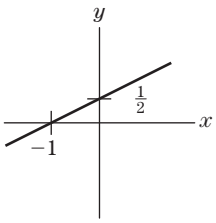
7.



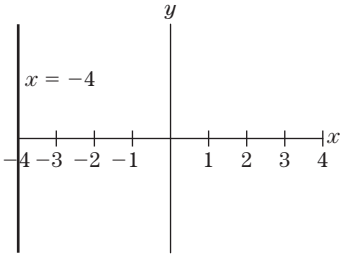
8.



9.



10.



11. $\left(-\frac{1}{3}, 0\right), (0, 3)$ **12.** $(0, -1), (-2, 0)$ **13.** y-intercept $(0, 5)$ **14.** $(0, 14)$ **15.** $(0, 0)$ **16.** $(0, 1), \left(\frac{-2}{3}, 0\right)$

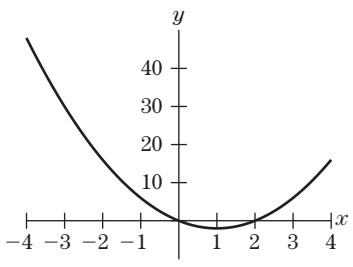
17. (a) \$114 **(b)** $f(x) = .45x + 24$ **18.** $f(x) = 5000 + .10x$ **19.** $700x + 1900$, x = number of days **20.** 65 mph

21. The cost for another 5% is \$25 million. The cost for the final 5% is 21 times as much. **22. (a)** 100 million **(b)** $\approx$ 728.57 million

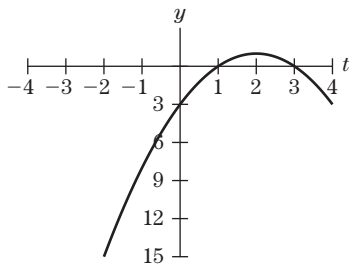
23. (a) $K = \frac{1}{250}$, $V = \frac{1}{50}$ **(b)** $\left(-\frac{1}{K}, 0\right), \left(0, \frac{1}{V}\right)$ **24.** $V = \frac{1}{60}$, $K = \frac{1}{500}$ **25.** $a = 3, b = -4, c = 0$ **26.** $a = \frac{1}{3}, b = -2, c = \frac{2}{3}$

27. $a = -2, b = 3, c = 1$ **28.** $a = 4, b = -2, c = 3$ **29.** $a = -1, b = 0, c = 1$ **30.** $a = \frac{1}{2}, b = \sqrt{3}, c = -\pi$

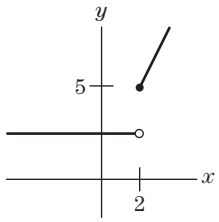
31.



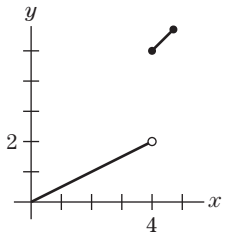
32.



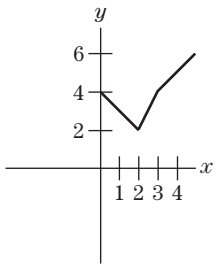
33.



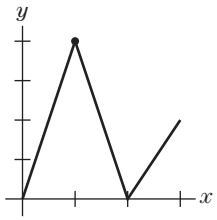
34.



35.



36.

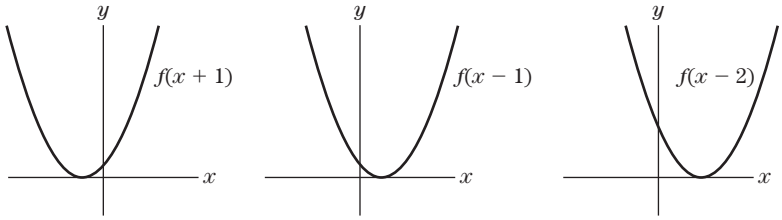


37. 1 **38.** $f(5) = \frac{1}{32}$ **39.** 10^{-2} **40.** $f(\pi) = \pi$ **41.** 2.5 **42.** $f(-\frac{2}{3}) = \frac{2}{3}$ **43.** $-3985, 3008$
44. $f(-\frac{1}{2}) = -5.6875, f(3) = 133$ **45.** $-4.60569, 231.499$ **46.** $f(2) = .103, f(6) = .032$

Exercises 0.3, page 23

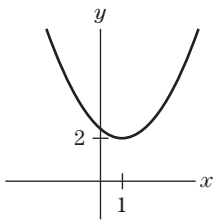
1. $x^2 + 9x + 1$ **2.** $3x^2 - 4$ **3.** $9x^3 + 9x$ **4.** $45x - 18x^3$ **5.** $\dfrac{t^2+1}{9t}$ **6.** $\dfrac{9t}{5-2t^2}$ **7.** $\dfrac{3x+1}{x^2-x-6}$ **8.** $\dfrac{x+6}{x^2-8x+12}$
9. $\dfrac{4x}{x^2-12x+32}$ **10.** $\dfrac{-2x}{x^2+8x+15}$ **11.** $\dfrac{2x^2+5x+50}{x^2-100}$ **12.** $\dfrac{2x^2+72}{x^2-36}$ **13.** $\dfrac{2x^2-2x+10}{x^2+3x-10}$ **14.** $\dfrac{2t^2+2}{3t^2-7t+2}$ **15.** $\dfrac{-x^2+5x}{x^2+3x-10}$
16. $\dfrac{-x^2+4x+5}{3x^2+14x-5}$ **17.** $\dfrac{x^2+5x}{-x^2+7x-10}$ **18.** $\dfrac{s^2-s-2}{3s^2-s}$ **19.** $\dfrac{-x^2+3x+4}{x^2+5x-6}$ **20.** $\dfrac{12x+14}{x^2+7x}$ **21.** $\dfrac{-x^2-3x}{x^2+15x+50}$ **22.** $\dfrac{1}{-2t+1}$
23. $\dfrac{5u-1}{5u+1}, u \neq 0$ **24.** $\dfrac{1+x^2}{3-x^2}$ **25.** $\left(\dfrac{x}{1-x}\right)^6$ **26.** $t^{18} - 5t^{12} + 1$ **27.** $\left(\dfrac{x}{1-x}\right)^3 - 5\left(\dfrac{x}{x-1}\right)^2 + 1$ **28.** $\dfrac{x^6}{1-x^6}$ **29.** $\dfrac{t^3-5t^2+1}{-t^3+5t^2}$
30. $(x^3 - 5x^2 + 1)^6$ **31.** $2xh + h^2$ **32.** $\dfrac{-h}{x(x+h)}$ **33.** $4 - 2t - h$ **34.** $3t^2 + 3th + h^2$ **35. (a)** $C(A(t)) = 3000 + 1600t - 40t^2$
(b) \$6040 **36. (a)** $C(f(t)) = 10t^2 + 240t + 77.5$ **(b)** \$1197.50 **37.** $h(x) = x + \dfrac{1}{8}$; $h(x)$ converts from British sizes to U.S. sizes.

38.

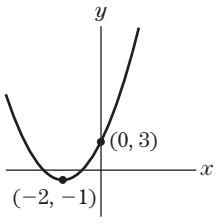


The graph of $f(x + a)$ is the graph of $f(x)$ shifted left (if $a > 0$) or right (if $a < 0$) by $|a|$ units.
39. The graph of $f(x) + c$ is the graph of $f(x)$ shifted up (if $c > 0$) or down (if $c < 0$) by $|c|$ units.

40.



41.



42. Not the same
43. $f(f(x)) = x, x \neq 1$

Exercises 0.4, page 31

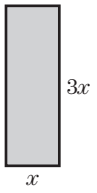
1. $2, \frac{3}{2}$ **2.** $x = -1, \frac{1}{3}$ **3.** $\frac{3}{2}$ **4.** $x = -2$ **5.** No zeros **6.** $\frac{7 \pm \sqrt{5}}{22}$ **7.** $1, -\frac{1}{5}$ **8.** No solution **9.** $5, 4$ **10.** $\frac{\sqrt{2} \pm \sqrt{7}}{2}$
11. $2 + \frac{\sqrt{6}}{3}, 2 - \frac{\sqrt{6}}{3}$ **12.** $x = \frac{2}{3}$ **13.** $(x+5)(x+3)$ **14.** $(x-2)(x-8)$ **15.** $(x-4)(x+4)$ **16.** $(x+1)(x-1)$ **17.** $3(x+2)^2$
18. $2(x-3)^2$ **19.** $-2(x-3)(x+5)$ **20.** $-3(x-5)(x+1)$ **21.** $x(3-x)$ **22.** $(2x+1)(2x-1)$ **23.** $-2x(x-\sqrt{3})(x+\sqrt{3})$
24. $-x(x-8)(x+2)$ **25.** $(x-1)(x^2+x+1)$ **26.** $(x+5)(x^2-5x+25)$ **27.** $(2x+3)(4x^2-6x+9)$ **28.** $(x-\frac{1}{2})(x^2+\frac{x}{2}+\frac{1}{4})$
29. $(x-7)^2$ **30.** $(x+\frac{1}{2})^2$ **31.** $(-1, 1), (5, 19)$ **32.** $(9, 0), (2, -7)$ **33.** $(-1, 9), (4, 4)$ **34.** $(-3, 36), (-2, 21)$ **35.** $(0, 0), (2, -2)$
36. $(0, 0), (2 + 2\sqrt{2}, 4 + 4\sqrt{2}), (2 - 2\sqrt{2}, 4 - 4\sqrt{2})$ **37.** $(0, 5), (2 - \sqrt{3}, 25 - 23\sqrt{3}/2), (2 + \sqrt{3}, 25 + 23\sqrt{3}/2)$
38. $(0, 0)$ $(2, 228)$ **39.** $-7, 3$ **40.** $x = 4, 5$ **41.** $-2, 3$ **42.** $x = -1, 6$ **43.** -7 **44.** $x = 4$ **45.** 16,667 and 78,571 subscribers
46. 50 mph **47.** $-1, 2$ **48.** $x = 1, -2$ **49.** ≈ 4.56 **50.** $x = 1.17, -.689$ **51.** $\approx (-.41, -1.83), (2.41, 3.83)$
52. $x = \frac{1 \pm \sqrt{13}}{4} \approx -.65$ and 1.15 **53.** $\approx (2.14, -25.73), (4.10, -21.80)$ **54.** $x \approx 1.27, y \approx .79$ **55.** $[-5, 22]$ by $[-1400, 100]$
56. $[-5, 5]$ by $[-100, 100]$ **57.** $[-20, 4]$ by $[-500, 2500]$ **58.** $[-10, 20]$ by $[-100, 100]$

Exercises 0.5, page 39

1. 27 **2.** -8 **3.** 1 **4.** 0 **5.** .0001 **6.** 100,000,000 **7.** -16 **8.** 0.000001 **9.** 4 **10.** 3 **11.** .01 **12.** $\frac{1}{5}$ **13.** $\frac{1}{6}$ **14.** 2
15. 100 **16.** $-\frac{1}{5}$ **17.** 16 **18.** 8 **19.** 125 **20.** 9 **21.** 1 **22.** 27 **23.** 4 **24.** 27 **25.** $\frac{1}{2}$ **26.** 4 **27.** 1000 **28.** 1 **29.** 10
30. 27 **31.** 6 **32.** 3 **33.** 16 **34.** 9 **35.** 18 **36.** 10 **37.** $\frac{4}{9}$ **38.** 15 **39.** 7 **40.** 1 **41.** x^6y^6 **42.** x^2 **43.** x^3y^3 **44.** x^3
45. $\dfrac{1}{x^{1/2}}$ **46.** xy^2 **47.** $\dfrac{x^{12}}{y^6}$ **48.** $\dfrac{y^2}{x^2}$ **49.** $x^{12}y^{20}$ **50.** $1 + 2x + x^2$ **51.** x^2y^6 **52.** x^4 **53.** $16x^4$ **54.** $\dfrac{-1}{5x^3}$ **55.** x^2 **56.** x^3y^2
57. $\dfrac{1}{x^7}$ **58.** $-27x^3$ **59.** x **60.** $\dfrac{1}{3\sqrt{x}}$ **61.** $\dfrac{27x^6}{8y^3}$ **62.** $\dfrac{1}{x^3y}$ **63.** $2\sqrt{x}$ **64.** $\dfrac{x^5}{y}$ **65.** $\dfrac{1}{8x^6}$ **66.** $4y^6$ **67.** $\dfrac{1}{32x^2}$ **68.** $\dfrac{125\sqrt{y}}{\sqrt{x}}$
69. $9x^3$ **70.** $\dfrac{-8}{y^3}$ **71.** $\dfrac{1}{x^{5/3}}$ **72.** $x^{7/3}$ **73.** $\dfrac{1}{x^{7/3}}$ **74.** $\dfrac{1}{x}$ **75.** $\dfrac{1}{x^5}$ **76.** $x^{7/6}$ **77.** $\dfrac{1}{x^{5/6}}$ **78.** $\dfrac{1}{x^{5/9}}$ **79.** $\dfrac{1}{x^{2/3}}$ **80.** $\dfrac{1}{x^{2/3}}$ **81.** $x^{1/9}$
82. x^4 **83.** $x - 1$ **84.** $2x - 1$ **85.** $1 + 6x^{1/2}$ **86.** $\dfrac{1}{y} - \dfrac{1}{x}$ **87.** $a^{1/2} \cdot b^{1/2} = (ab)^{1/2}$ (Law 5) **88.** Law 6 **89.** 16 **90.** 64 **91.** $\frac{1}{4}$
92. 2 **93.** 8 **94.** $\frac{1}{2}$ **95.** $\frac{1}{32}$ **96.** 1 **97.** \$709.26 **98.** 1295.65 **99.** \$127,857.61 **100.** \$28,515.22 **101.** \$164.70 **102.** \$522.97
103. \$1592.75 **104.** \$1795.80 **105.** \$3268.00 **106.** \$26,483.83 **107.** $\frac{500}{256}(256 + 256r + 96r^2 + 16r^3 + r^4) = A$
108. $\frac{125}{2}(16 + 32r + 24r^2 + 8r^3 + r^4) = A$ **109.** $\frac{1}{20}(2x)^2 = \frac{1}{20}(4x^2) = 4(\frac{1}{20}x^2)$ **110.** 0.00005 **111.** .0008103 **112.** 13,500,000,000,000
113. .00000823

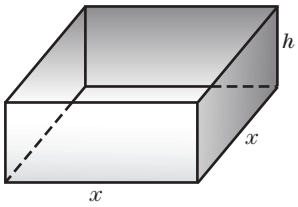
Exercises 0.6, page 47

1.



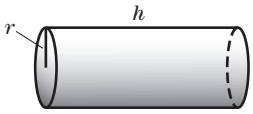
2. Base $= x$, height $= h$, radius $= \dfrac{x}{2}$

3.



4. Length $= x$, width $= w$, height $= \dfrac{x}{2}$

5.

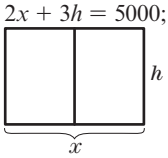


6. $h =$ height $\dfrac{h}{2} =$ radius **7.** $P = 8x$; $3x^2 = 25$ **8.** $A = 3x^2$; $30 = 8x$ **9.** $A = \pi r^2$; $2\pi r = 15$

10. $P = 2r + 2h + \pi r$; $A = 2rh + \pi\dfrac{r^2}{2} = 2.5$ **11.** $V = x^2h$; $x^2 + 4xh = 65$ **12.** $S = 3xw + x^2$; $\dfrac{x^2w}{2} = 10$

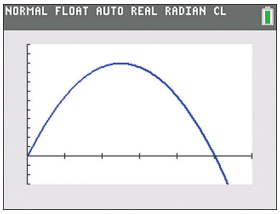
13. $\pi r^2h = 100$; $C = 11\pi r^2 + 14\pi rh$ **14.** $30\pi = \dfrac{3\pi h^2}{2}$ $V = \dfrac{\pi h^3}{4}$

15. $2x + 3h = 5000$; $A = xh$



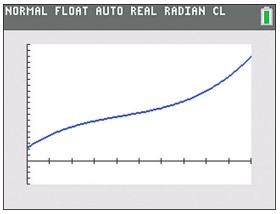
16. $2500 = lh$, $f = 4l + 2h$ **17.** $C = 36l + 20h$ **18.** $150 = 5x^2 + 16xh$ **19.** 75 cm^2 **20.** 54πin^2 **21.** **(a)** 38 **(b)** \$40
22. **(a)** $P(100) =$ \$315 **(b)** \$3.90 **23.** **(a)** 200 **(b)** 275 **(c)** 25 **24.** **(a)** $x = 30$ thousand subscribers **(b)** 500 extra subscribers
25. **(a)** $P(x) = 12x - 800$ **(b)** \$640 **(c)** \$3150 **26.** **(a)** $P(12) =$ \$1300 **(b)** $P(15) =$ \$3250 **27.** 270 cents **28.** $r = 1, 6.87$
29. A 100-in.^{3} cylinder of radius 3 in. costs \$1.62 to construct. **30.** Cheapest cylinder has radius 3 and costs \$1.62 to make.
31. \$1.08 **32.** 168 cents **33.** $R(30) = 1800$; $C(30) = 1200$ **34.** 20 units **35.** 40 **36.** \$600 **37.** $C(1000) = 4000$
38. Find 3500 on the y-axis. Move across to the graph and then down, finding the appropriate x. **39.** Find the y-coordinate of the point on the graph whose x-coordinate is 400. **40.** \$261 **41.** The greatest profit, \$52,500, occurs when 2500 units of goods are produced.
42. When 1500 units are made, the profit is \$42,500. **43.** Find the x-coordinate of the point on the graph whose y-coordinate is 30,000.
44. Find 2000 on the x-axis. Move up to intercept the graph and then across to the y-axis. **45.** Find $h(3)$. Find the y-coordinate of the point on the graph whose t-coordinate is 3. **46.** Find the first coordinate of the highest point on the graph. **47.** Find the maximum value of $h(t)$. Find the y-coordinate of the highest point of the graph. **48.** Find the point where the graph intersects the t-axis. **49.** Solve $h(t) = 100$. Find the t-coordinates of the points whose y-coordinate is 100. **50.** Find the point where the graph intersects the y-axis.

51. **(a)**

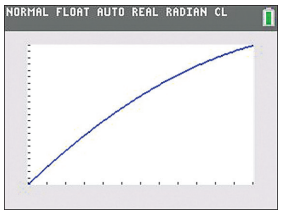


(b) 96 feet
(c) 1 and 4 seconds
(d) 5 seconds
(e) 2.5 seconds; 100 feet

52. **(a)**



(b) \$1050
(c) \$22.11
(d) 10

53. (a) 

(b) 350 bicycles per year
(c) \$68,000
(d) \$5000
(e) No, revenue would only increase by \$4000.

Chapter 0: Answers to Fundamental Concept Check Exercises, page 54

1. Real numbers can be thought of as points on a number line, where each number corresponds to one point on the line, and each point determines one real number. Every real number has a possibly infinite decimal representation. A rational number is a real number with a finite or infinite repeating decimal, such as $-\frac{5}{2} = -2.5$, 1, $\frac{13}{3} = 4.333$. An irrational number is a real number with an infinite decimal representation whose digits form no repeating pattern, such as $-\sqrt{2} = -1.414213\ldots$, $\pi = 3.14159\ldots$. **2.** $x < y$ means x is less than y; $x \le y$ means x is less than or equal to y; $x > y$ means x is greater than y; $x \ge y$ means x is greater than or equal to y. **3.** An open interval (a, b) does not contain its endpoints a and b, but a closed interval $[a, b]$ does contain a and b. **4.** A function of a variable x is a rule f that assigns to each value of x a unique number $f(x)$. **5.** The value of a function at x is the unique number $f(x)$. **6.** The domain is the set of values that the independent variable x is allowed to assume. The range of a function is the set of values that the function assumes. **7.** The graph of a function $f(x)$ is the curve that consists of the set of all points $(x, f(x))$ in the xy-plane. A curve is the graph of a function if, and only if, each vertical line cuts or touches the curve at no more than one point. **8.** A linear function is of the form $f(x) = mx + b$. When $m = 0$, the function is a constant function. $f(x) = 3x - .5$ is a linear function. $f(x) = -2$ is a constant function. **9.** An x-intercept is a point at which the graph of a function intersects the x-axis. The y-intercept is the point at which the graph intersects the y-axis. To find the x-intercept, set $f(x) = 0$, and solve (if possible) for x in the equation $f(x) = 0$. The y-intercept is the point $(0, f(0))$. **10.** A quadratic function is of the form $f(x) = ax^2 + bx + c$, where $a \neq 0$. The graph is a parabola. **11.** Quadratic function: $f(x) = ax^2 + bx + c$, where $a \neq 0$; $f(x) = -2x^2 + 4x + 9$. Polynomial function: $p(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_0$, where n is a nonnegative integer and $a_0, a_1, \ldots, a_n \neq 0$ are given numbers; $f(x) = x^5 + 3x^3 - 7x + 3$. Rational function: $h(x) = \dfrac{f(x)}{g(x)}$, where f and g are polynomials; $h(x) = \dfrac{2x-3}{x^2+1}$. Power function: $f(x) = x^r$, where r is a real number; $f(x) = \sqrt{x} = x^{1/2}$. **12.** $f(x) = |x|$, the absoluate value of x is x, if $x \ge 0$, and $-x$ if $x < 0$. **13.** Sum $f(x) + g(x)$, difference $f(x) - g(x)$, product $f(x)g(x)$, quotient $\dfrac{f(x)}{g(x)}$, composition $f(g(x))$. If $f(x) = 3x^2$ and $g(x) = 3x + 1$, then $f(x) + g(x) = 3x^2 + 3x + 1$, $f(x) - g(x) = 3x^2 - 3x - 1$, $f(x)g(x) = 3x^2(3x + 1) = 9x^3 + 3x^2$, $\dfrac{f(x)}{g(x)} = \dfrac{3x^2}{3x+1}$, $f(g(x)) = 3[3x + 1]^2 = 27x^2 + 18x + 3$. **14.** $x = a$ is a zero of $f(x)$ if $f(a) = 0$. **15.** By factoring or using the quadratic equation. **16.** $b^r b^s = b^{r+s}$, $b^{-r} = \dfrac{1}{b^r}$, $\dfrac{b^r}{b^s} = b^r \cdot b^{-s} = b^{r-s}$, $(b^r)^s = b^{rs}$, $(ab)^r = a^r b^r$, $\left(\dfrac{a}{b}\right)^r = \dfrac{a^r}{b^r}$ **17.** In the formula $A = P(1 + i)^n$, A is the compound amount, P the principal amount, i the interest rate, and n the number of interest periods. **18.** To solve $f(x) = b$ geometrically from the graph of $y = f(x)$, draw the horizontal line $y = b$. The line intersects the graph at a point (a, b) if, and only if, $f(a) = b$, in which case $x = a$ is a solution of $f(x) = b$. **19.** To find $f(a)$ geometrically from the graph of $y = f(x)$, draw the vertical line $x = a$. This line intersects the graph at the point $(a, f(a))$.

Chapter 0: Chapter Review Exercises, page 54

1. $2, 27\frac{1}{3}, -2, -2\frac{1}{8}, \frac{5\sqrt{2}}{2}$ **2.** $f(0) = 0, f\left(-\frac{1}{4}\right) = -\frac{5}{16}, f\left(\frac{1}{\sqrt{2}}\right) = \frac{2\sqrt{2}+3}{2}$ **3.** $a^2 - 4a + 2$ **4.** $f(a+1) = \dfrac{1}{a+2} - (a+1)^2$

5. $x \neq 0, -3$ **6.** $x \ge 1$ **7.** All x **8.** $x > 0$ **9.** yes **10.** No **11.** $5x(x-1)(x+4)$ **12.** $3(x-5)(x+4)$ **13.** $(-1)(x-6)(x+3)$

14. $x^3(x-2)(x+1)$ **15.** $-\frac{2}{5}, 1$ **16.** $x = \dfrac{-1 \pm \sqrt{17}}{4}$ **17.** $\left(\dfrac{5+3\sqrt{5}}{10}, \dfrac{3\sqrt{5}}{5}\right), \left(\dfrac{5-3\sqrt{5}}{10}, \dfrac{-3\sqrt{5}}{5}\right)$

18. $(-\sqrt{6}, -\sqrt{6}-5), (\sqrt{6}, \sqrt{6}-5)$ **19.** $x^2 + x - 1$ **20.** $x^2 - 5x + 1$ **21.** $x^{5/2} - 2x^{3/2}$ **22.** $3x^3 - 7x^2 + 2x$ **23.** $x^{3/2} - 2x^{1/2}$

24. $3x^{3/2} - x^{1/2}$ **25.** $\dfrac{x^2 - x + 1}{x^2 - 1}$ **26.** $\dfrac{x^3 + x^2 + x}{(x+2)(x^2-1)}$ **27.** $-\dfrac{3x^2+1}{3x^2+4x+1}$ **28.** $\dfrac{5x^2 + x - 2}{(x^2-1)(3x+1)}$ **29.** $\dfrac{-3x^2 + 9x - 10}{3x^2 - 5x - 8}$

30. $\dfrac{-x^2 + 3x - 1}{x^2 - 1}$ **31.** $\dfrac{1}{x^4} - \dfrac{2}{x^2} + 4$ **32.** $\dfrac{1}{(x^2 - 2x + 4)^2}$ **33.** $(\sqrt{x} - 1)^2$ **34.** $\dfrac{|x|}{1 - |x|}$ **35.** $\dfrac{1}{(\sqrt{x}-1)^2} - \dfrac{2}{\sqrt{x}-1} + 4$

36. $(\sqrt{x^2 - 2x + 4} - 1)^{-1}$ **37.** 27, 32, 4 **38.** 1000, 0.1 **39.** $301 + 10t + .04t^2$ **40.** $R(d) = 30\left(1 - \dfrac{200}{d+200}\right) - 36\left(1 - \dfrac{200}{d+200}\right)^2$

41. $x^2 + 2x + 1$ **42.** x^6/y^3 **43.** x **44.** $8x$ **45. (a)** $A(t) = 15{,}000\left(1 + \frac{.04}{12}\right)^{12t} = 15{,}000(1.0333)^{12t}$

(b) $A(2) = \$16{,}247.1$, $A(5) = \$18{,}314.9$ **46. (a)** $A(t) = 7000\left(1 + \frac{.09}{2}\right)^{2t} = 7000(1.045)^{2t}$ **(b)** $A(10) = \$16{,}882$, $A(20) = \$40{,}714.6$

47. (a) $A(r) = 15{,}000(1 + r)^{10}$ **(b)** $A(.04) \approx \$22{,}203.7$, $A(.06) \approx \$26{,}862.7$ **48. (a)** $A(r) = 7000(1 + r)^{20}$

(b) $A(.07) \approx \$27{,}087.8$, $A(.12) \approx \$67{,}524.1$