1. Find the slope of the line determined by points $A(-1, 3)$ and $B(4, 7)$.

   1. _____

   (A) $\dfrac{3}{4}$ (B) $\dfrac{4}{3}$ (C) $\dfrac{4}{5}$ (D) $\dfrac{5}{4}$ (E) $-\dfrac{4}{5}$

2. Find an equation for the line through the point $P(3, -2)$ that is perpendicular to the line $3x + 2y = 5$.

   2. _____

   (A) $y = -\dfrac{2}{3}x$ (B) $y = -\dfrac{3}{2}x + \dfrac{5}{2}$

   (C) $y = \dfrac{2}{3}x - 4$ (D) $y = \dfrac{3}{2}x - \dfrac{13}{2}$

   (E) $y = -\dfrac{5}{3}x + 3$

3.

   3. _____

Age (weeks)	2	3	4	5	6
Weight (pounds)	4.2	6.3	7.1	9.2	10.5

   The table shows the growth of a certain puppy.
   Find the linear regression equation for the data. Use the
   linear regression equation to estimate the weight of the
   puppy at age 8 weeks, rounded to the nearest pound.

   (A) 13 pounds   (B) 14 pounds   (C) 15 pounds
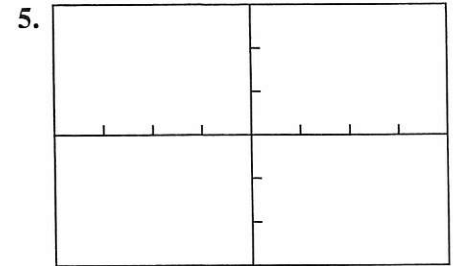   (D) 16 pounds   (E) 17 pounds

4. Which of the following is an odd function?

   4. _____

   (A) $y = (x - 5)^3$ (B) $y = 2 + |x|$ (C) $y = x^5 - \sqrt{x}$

   (D) $y = 2x^3 + 4x$ (E) $y = x^3 \cdot x^5$

5. Draw the graph of the function.

   5.

   $$f(x) = \begin{cases} -2, & x < -2 \\ x^2 - 2, & -2 \le x < 0 \\ x - 2, & x \ge 0 \end{cases}$$

   [−4, 4] by [−3, 3]

6. Which of the following exponential expressions is equivalent to 25^{4x}?

   6. _____

   (A) 5^{6x} (B) 5^{8x} (C) 5^{10x} (D) 5^{12x} (E) 5^{14x}
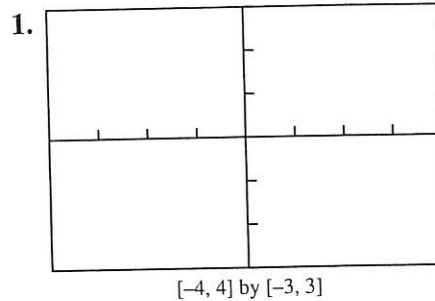
7. Use a graph to solve the equation $3^{-x} = 7$.

   7. _____

   (A) $x \approx -2.33$ (B) $x \approx -1.77$ (C) $x \approx 0.56$
   (D) $x \approx 1.77$ (E) $x \approx 2.33$

1. Graph the parametrized curve given by $x = t - 2$, $y = -2 + \sqrt{5t}$, $0 \le t \le 4$. Indicate the direction in which the curve is traced.

1.

$[-4, 4]$ by $[-3, 3]$

2. Find a Cartesian equation for a curve that contains the parametrized curve given by $x = t - 2$, $y = -2 + \sqrt{5t}$, $0 \le t \le 4$.

2. _____

(A) $y = -2 + \sqrt{5x + 10}$ (B) $y = -2 + \sqrt{5x}$

(C) $y = -2 + \sqrt{5x - 10}$ (D) $y = -2 + \sqrt{x + 2}$

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

3. For $f(x) = x^2 - 3$, $x \le 0$, find $f^{-1}(x)$.

3. _____

(A) $f^{-1}(x) = \sqrt{x + 2}$ (B) $f^{-1}(x) = -\sqrt{x + 3}$

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

(E) $f^{-1}(x) = 3 - x$

4. Let $f(x) = e^{x - 1}$, $0 \le x \le 3$. Which of the following is a parametrization for the graph of $y = f^{-1}(x)$?

4. _____

(A) $x = t, y = e^{t - 1}, 0 \le t \le 3$
(B) $x = t, y = 1 + \ln t, 0 \le t \le 3$
(C) $x = e^{t - 1}, y = t, 0 \le t \le 3$
(D) $x = 1 + \ln t, y = t, 0 \le t \le 3$
(E) $x = t, y = e^{1-t}, 0 \le t \le 3$

5. Solve the equation $4^x + 4^{-x} = \dfrac{5}{2}$ algebraically.

5. _____

(A) $x = \dfrac{1}{2}$ (B) $x = -\dfrac{1}{2}, x = \dfrac{1}{2}$

(C) $x = -1, x = 1$ (D) $x = -\dfrac{1}{2}, x = 0, x = \dfrac{1}{2}$

(E) $x = -1, x = 0, x = 1$

6. Solve the equation $\sec x = \sqrt{2}$ in the interval $0 \le x \le 2\pi$.

6. _____

(A) $x = -\dfrac{\pi}{4}, x = \dfrac{\pi}{4}$ (B) $x = \dfrac{\pi}{4}, x = \dfrac{3\pi}{4}$

(C) $x = \dfrac{\pi}{4}, x = \dfrac{5\pi}{4}$ (D) $x = \dfrac{3\pi}{4}, x = \dfrac{5\pi}{4}$

(E) $x = \dfrac{\pi}{4}, x = \dfrac{7\pi}{4}$

Directions: Show all steps leading to your answers, including any intermediate results obtained using a graphing utility. Use the back of the test or another sheet of paper if necessary.

1. Find the slope of the line determined by points $A(8, -2)$ and $B(2, 7)$.

(A) $\dfrac{2}{3}$ (B) $-\dfrac{2}{3}$ (C) $\dfrac{3}{2}$ (D) $-\dfrac{3}{2}$ (E) -2

1. _____

2. Let L represent the line $y = \dfrac{3}{5}x + 7$. Write an equation for the line through $P(6, -4)$ that is **(a)** parallel to L, **(b)** perpendicular to L.

2. (a) _____

(b) _____

3. For the function $y = 5 - \sqrt{9 - x^2}$, **(a)** find the domain, **(b)** find the range, and **(c)** determine whether the function is odd, even or neither.
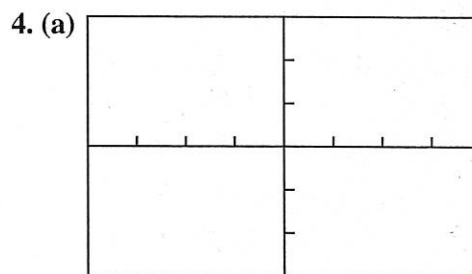
3. (a) _____

(b) _____

(c) _____

4. Let $f(x) = \begin{cases} -0.5x, & x < -2 \\ \sqrt{x + 2}, & x \geq -2 \end{cases}$.

(a) Draw the graph of $f(x)$.

(b) Find the domain.

(c) Find the range.

4. (a)

$[-4, 4]$ by $[-3, 3]$

(b) _____

(c) _____

5. Let $f(x) = x^2 + 5$ and $g(x) = \dfrac{1}{x}$. Find formulas for **(a)** $f \circ g$ and **(b)** $g \circ f$.

5. (a) _____

(b) _____

6. State the domain, range, and intercepts of the function $y = 2^{-x} - 1$.

6. Domain: _____

Range: _____

x-intercept(s): _____

y-intercept(s): _____

7. Use a graph to solve the equation $4 - 3^x = 0$.

7. _____

8. Suppose that in any given year, the population of a certain endangered species is reduced by 25%. If the population is now 7500, in how many years will the population be 4000?

8. _____

9. Find a parametrization for the left half of the parabola $y = x^2 - 4x + 3$.

9. _____

10. (a) Graph the parametrized curve described by $x = 2 \sin t$, $y = -3 \cos t$, $0 \le t \le \pi$. Indicate the direction in which the curve is traced.

10. (a)

[−4, 4] by [−3, 3]

(b) Find a Cartesian equation for the parametrized curve. What portion of the graph of the Cartesian equation is traced by the parametrized curve?

(b) _____

_____

_____

11. Let $f(x) = \sqrt[3]{x + 2}$ and $g(x) = x^3 - 2$.
Which of the following are true?
   I. $g(x) = f^{-1}(x)$ for all real values of x.
   II. $(f \circ g)(x) = 1$ for all real values of x.
   III. The function f is one-to-one.

   (A) I and II   (B) I and III   (C) II and III
   (D) III only   (E) I, II, and III

11. _____

12. Let $f(x) = \sqrt{3 - x}$.
Find an expression for $f^{-1}(x)$.
(Be sure to state any necessary domain restrictions.)

12. _____

13. The table gives Taiwan's nuclear power generation data in billions of kilowatt-hours. Let $x = 5$ represent 1980, $x = 10$ represent 1985, and so on.

Year	1980	1985	1990	1995
Energy produced	7.8	27.8	31.6	33.9

(a) Find a natural logarithm regression equation for the data.

(b) Predict when Taiwan's nuclear power generation will reach 40 billion kilowatt-hours.

13. (a) _____
(b) _____

14. An angle measuring $\dfrac{3\pi}{8}$ radians has its vertex at the center of a circle whose radius is 4 feet. Find the length of the subtended arc.

14. _____

15. Let $y = 3 \sin(2x - \pi) + 2$. Determine the period, domain, and range of the function.

15. Period: _____

Domain: _____

Range: _____

16. Solve the equation $\cot x = 4$ in the interval $0 \le x \le 2\pi$.
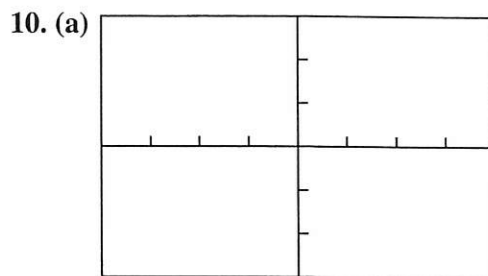
16. _____

Directions: Show all steps leading to your answers, including any intermediate results obtained using a graphing utility. Use the back of the test or another sheet of paper if necessary.

1. Find the slope of the line determined by points $P(-3, 7)$ and $Q(1, 13)$.

    (A) $\dfrac{2}{3}$ (B) $-\dfrac{2}{3}$ (C) $\dfrac{3}{2}$ (D) $-\dfrac{3}{2}$ (E) -2

    1. _____

2. Let L represent the line $y = -\dfrac{4}{3}x + 2$. Write an equation for the line through $P(9, -7)$ that is **(a)** parallel to L,

    (b) perpendicular to L.

    2. (a) _____

    (b) _____

3. For the function $y = -2 + \sqrt{x^2 - 25}$, **(a)** find the domain, **(b)** find the range, and **(c)** determine whether the function is odd, even or neither.
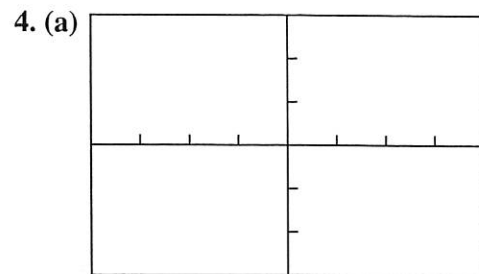
    3. (a) _____

    (b) _____

    (c) _____

4. Let $f(x) = \begin{cases} \sqrt{1 - x}, & x \le 1 \\ 0.5x - 2, & x > 1 \end{cases}$

    (a) Draw the graph of $g(x)$.

    (b) Find the domain.

    (c) Find the range.

    4. (a)

    [–4, 4] by [–3, 3]

    (b) _____

    (c) _____

5. Let $f(x) = \dfrac{1}{x - 2}$ and $g(x) = 5x^2$.

    Find formulas for **(a)** $f \circ g$ and **(b)** $g \circ f$.

    5. (a) _____

    (b) _____

6. State the domain, range, and intercepts of the function $y = 9 - 3^x$.

    6. Domain: _____

    Range: _____

    x-intercept(s): _____

    y-intercept(s): _____

7. Use a graph to solve the equation $2^{-x} - 6 = 0$.

    7. _____

8. Suppose that in any given year, the value of a certain investment is increased by 15%. If the value is now $15,000, in how many years will the value be $21,000?

    8. _____

9. Find a parametrization for the right half of the parabola $y = x^2 + 6x - 7$.

    9. _____

10. (a) Graph the parametrized curve described by
$x = 2\cos t$, $y = -\sin t$, $0 \le t \le \pi$. Indicate the
direction in which the curve is traced.

10. (a)

[–4, 4] by [–3, 3]

(b) Find a Cartesian equation for the parametrized curve.
What portion of the graph of the Cartesian equation
is traced by the parametrized curve?

(b) _____

_____

_____

11. Let $f(x) = \dfrac{1}{x^2 + 2}$, $x > 0$, and $g(x) = \sqrt{\dfrac{1}{x} - 2}$.
Which of the following are true?

11. _____

  I. $g(x) = f^{-1}(x)$ for all real values of x.

  II. $(g \circ f)(x) = x$ for all $x > 0$.

  III. The function f is one-to-one.

  (A) I and II   (B) I and III   (C) II and III
  (D) III only   (E) I, II, and III

12. Let $f(x) = -\sqrt{x + 5}$.
Find an expression for $f^{-1}(x)$.
(Be sure to state any necessary domain restrictions.)

12. _____

13. The table gives Sweden's nuclear power generation
data in billions of kilowatt-hours. Let $x = 5$ represent
1980, $x = 10$ represent 1985, and so on.

13. (a) _____
    (b) _____

Year	1980	1985	1990	1995
Energy produced	25.3	55.8	65.2	66.5

(a) Find a natural logarithm regression equation for
the data.

(b) Predict when Sweden's nuclear power
generation will reach 85 billion kilowatt-hours.

14. An angle measuring $\dfrac{5\pi}{6}$ radians has its vertex at the center
of a circle whose radius is 7 meters. Find the length of the
subtended arc.

14. _____

15. Let $y = 5\tan\left(x + \dfrac{\pi}{2}\right) - 3$. Determine the period,
domain, and range of the function.

15. Period: _____

    Domain: _____

    Range: _____

16. Solve the equation $\sec x = -3$ in the interval $0 \le x \le 2\pi$.
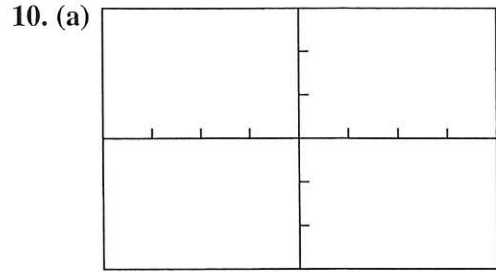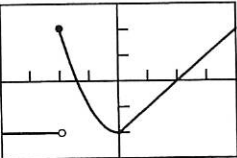
16. _____
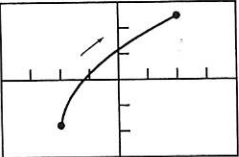
Assessment Answers

Chapter 1

Quiz: Sections 1.1–1.3

1. (C) **2.** (C)
3. (B) **4.** (D)

5.

[−4, 4] by [−3, 3]

6. (B) **7.** (B)

Quiz: Sections 1.4–1.6

1.

[−4, 4] by [−3, 3]

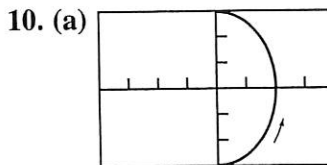**2.** (A) **3.** (B)
4. (C) **5.** (B)
6. (E)

Chapter 1 Test Form A

1. (D)

2. (a) $y = \dfrac{3}{5}x - \dfrac{38}{5}$ (b) $y = -\dfrac{5}{3}x + 6$

3. (a) $[-3, 3]$ (b) $[2, 5]$
  (c) Even

4. (a)
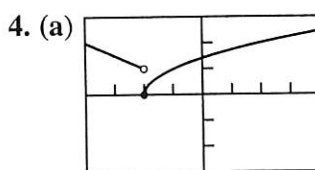
[−4, 4] by [−3, 3]

  (b) $(-\infty, \infty)$ (c) $[0, \infty)$

5. (a) $(f \circ g)(x) = \left(\dfrac{1}{x}\right)^2 + 5$ or $\dfrac{1}{x^2} + 5$

  (b) $(g \circ f)(x) = \dfrac{1}{x^2 + 5}$

6. Domain: $(-\infty, \infty)$
  Range: $(-1, \infty)$
  x-intercept: 0
  y-intercept: 0

7. $x \approx 1.262$ **8.** About 2.19 years

9. One possible answer: $x = t$, $y = t^2 - 4t + 3$,
  $t \leq 2$

10. (a)

[−4, 4] by [−3, 3]

  (b) $\left(\dfrac{x}{2}\right)^2 + \left(\dfrac{y}{3}\right)^2 = 1$; right half of ellipse

11. (B)

12. $f^{-1}(x) = 3 - x^2$, $x \geq 0$

13. (a) $y = -20.524 + 19.051 \ln x$
  (b) $x \approx 23.971$ or about 24, in 1999

14. $\dfrac{3\pi}{2}$ ft or about 4.71 ft

15. Period: π; Domain: All reals; Range: $[-1, 5]$

16. $x = \tan^{-1}(0.25) \approx 0.245$,
  $x = \pi + \tan^{-1}(0.25) \approx 3.387$
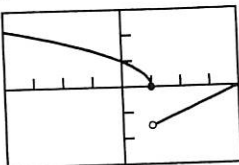
Chapter 1 Test Form B

1. (C)

2. (a) $y = -\frac{4}{3}x + 5$ (b) $y = \frac{3}{4}x - \frac{55}{4}$

3. (a) $(-\infty, -5] \cup [5, \infty)$
   (b) $[-2, \infty)$ (c) Even

4. (a)

[-4, 4] by [-3, 3]

   (b) $(-\infty, \infty)$ (c) $(-1.5, \infty)$

5. (a) $(f \circ g)(x) = \dfrac{1}{5x^2 - 2}$
   (b) $(g \circ f)(x) = \dfrac{5}{(x - 2)^2}$

6. Domain: $(-\infty, \infty)$
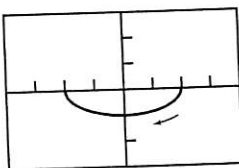   Range: $(-\infty, 9)$
   x-intercept: 2
   y-intercept: 8

7. $x \approx -2.585$ 8. About 2.41 years

9. One possible answer: $x = t, y = t^2 + 6t - 7,$
   $t \geq -3$

10. (a)

[-4, 4] by [-3, 3]

   (b) $\left(\dfrac{x}{2}\right)^2 + y^2 = 1$; lower half of ellipse

11. (C)

12. $f^{-1}(x) = x^2 - 5, x \leq 0$

13. (a) $y \approx -20.907 + 30.827 \ln x$
    (b) $x \approx 31.05$ or about 31, in 2006

14. $\dfrac{35\pi}{6}$ m or about 18.33 m

15. Period: π; Domain: $x \neq k\pi$ for integers k;
    Range: All reals

16. $x = \cos^{-1}\left(-\dfrac{1}{3}\right) \approx 1.911,$

    $x = 2\pi - \cos^{-1}\left(-\dfrac{1}{3}\right) \approx 4.373$