

Review Exercises

ANSWERS

1. Which of the following is not true about the graph of $f(t) = \sin t$? **c**
- It has no sharp corners.
 - It crosses the horizontal axis more than once.
 - It rises higher and higher as t gets larger.
 - It is periodic.
 - It has no vertical asymptotes.

In Exercises 2-4, graph each function on the given interval.

2. $f(t) = \sin t$ $\left[\frac{7\pi}{2}, 7\pi\right]$ 3. $g(t) = \cos t$ $\left[-5\pi, -\frac{7\pi}{2}\right]$
 4. $h(t) = \tan t$ $[2\pi, 3\pi]$

In Exercises 5-7, find all the exact t -values for which the given statement is true.

5. $\cos t = 1$ $0 = n2\pi$, where n is an integer 6. $\sin t = -\frac{1}{2}$ $\frac{7\pi}{6} + n2\pi$ and $\frac{11\pi}{6} + n2\pi$, where n is an integer
 7. $\tan t = -\sqrt{3}$ $-\frac{\pi}{3} + n\pi$, where n is an integer

In Exercises 8-10, list the transformations that change the graph of f into the graph of g . State the domain and range of g .

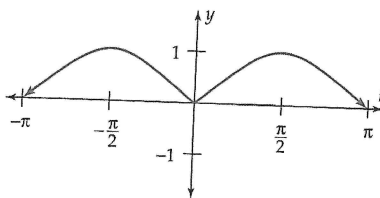
8. $f(t) = \sin t$ $g(t) = -\frac{1}{2}\sin t$ 9. $f(t) = \tan t$ $g(t) = -\tan 2t$
 10. $f(t) = \cos t$ $g(t) = \cos\left(-\frac{1}{2}t\right) - 1$

In Exercises 11-13, sketch the graph of each function.

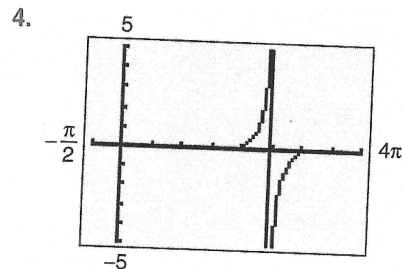
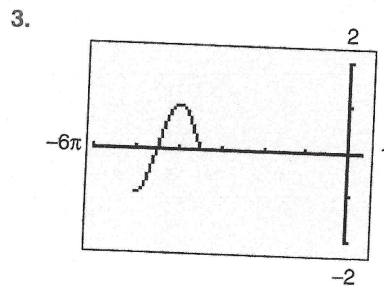
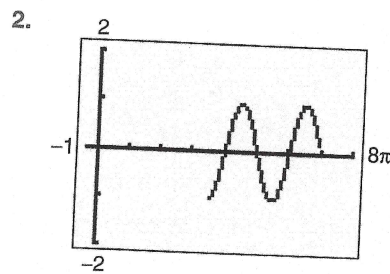
11. $g(t) = -3\cos t$ 12. $h(t) = \tan t - 4$
 13. $k(t) = 2\sin t + 3$

14. Which of the following functions has the graph shown below between $-\pi$ and π ? **c**

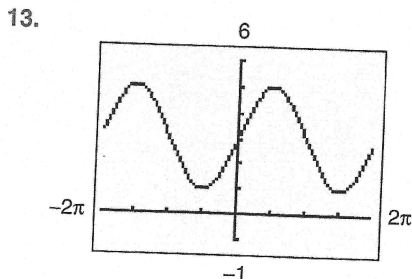
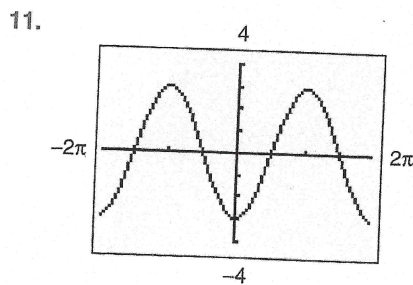
- a. $f(x) = \begin{cases} \sin x, & \text{if } x \geq 0 \\ \cos x, & \text{if } x < 0 \end{cases}$
 b. $g(x) = \cos x - 1$
 c. $h(x) = \begin{cases} \sin x, & \text{if } x \geq 0 \\ \sin(-x), & \text{if } x < 0 \end{cases}$
 d. $k(x) = |\cos x|$
 e. $p(x) = \sqrt{1 - \sin^2 x}$



15. Between (and including) 0 and 2π , the function $h(t) = \tan t$ has ? . **a**
- 3 zeros and is undefined at 2 places
 - 2 zeros and is undefined at 3 places
 - 2 zeros and is undefined at 2 places
 - 3 zeros and is defined everywhere
 - no zeros and is undefined at 3 places

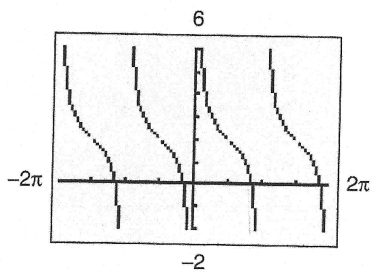


8. g is the graph of f reflected across the x -axis and compressed vertically by a factor of $\frac{1}{2}$.
 domain: all real numbers; range: $-1 \leq g(t) \leq 1$
9. g is the graph of f reflected across the x -axis and compressed horizontally by a factor of $\frac{1}{2}$.
 domain: all real numbers except $t = \frac{\pi}{4} + k\frac{\pi}{2}$, where k is an integer; range: all real numbers
10. g is the graph of f reflected across the y -axis, stretched horizontally by a factor of 2, and shifted 1 unit down. domain: all real numbers; range: $-2 \leq g(t) < 0$

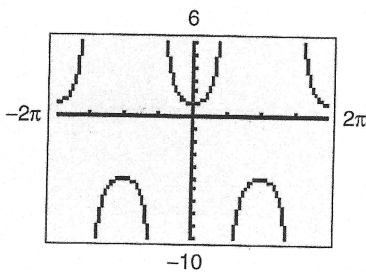


16. c
17. c
18. d

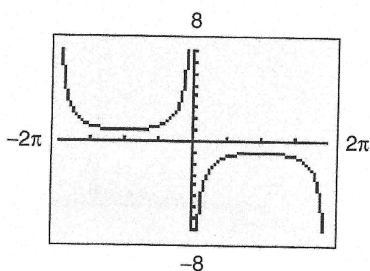
19.



20.

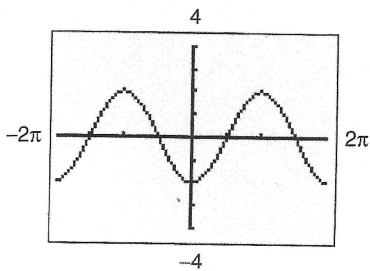


21.

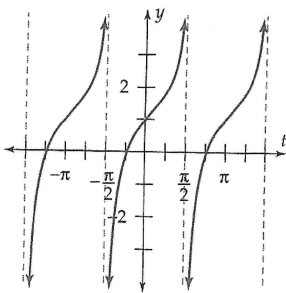
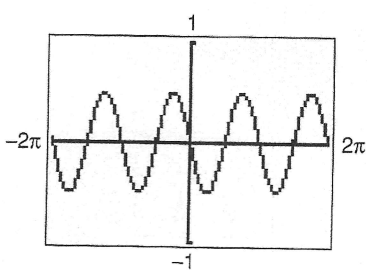


22. odd
23. even
24. a. $\frac{3}{2}$
b. $\frac{\pi}{5} \approx 0.6283$

25.



26.



Section 7.2

16. Which of the statements i–iii are true?
i. The sine function is an odd function.
ii. The cosine function is an odd function.
iii. The tangent function is an odd function.
a. i and ii only
b. ii only
c. i and iii only
d. all of them
e. none of them

17. Which of the following functions has the graph shown at left?

- a. $f(t) = \tan t$
b. $g(t) = \tan\left(t + \frac{\pi}{2}\right)$
c. $h(t) = 1 + \tan t$
d. $k(t) = 3 \tan t$
e. $p(t) = -\tan t$

18. Which of the following is true about $\sec t$?

- a. $\sec(0) = 0$
b. $\sec t = \frac{1}{\sin t}$
c. Its graph has no asymptotes.
d. It is a periodic function.
e. It is never negative.

In Exercises 19–21, sketch the graph of each function.

19. $g(t) = \cot t + 2$

20. $f(t) = 3 \sec t - 2$

21. $h(t) = -\csc\left(\frac{1}{2}t\right)$

In Exercises 22–23, complete the statement with “odd” or “even”.

22. The cosecant function is an _____ function.

23. The secant function is an _____ function.

24. Let $f(t) = \frac{3}{2} \sin 5t$.

- a. What is the largest possible value of $f(t)$?
b. Find the smallest positive number t such that $f(t) = 0$.

25. Sketch the graph of $g(t) = -2 \cos t$.

26. Sketch the graph of $f(t) = -\frac{1}{2} \sin 2t$ on the interval $-2\pi \leq t \leq 2\pi$.

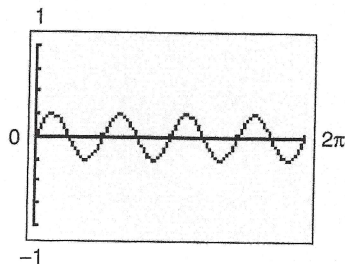
27. Sketch the graph of $f(t) = \sin 4t$ on the interval $0 \leq t \leq 2\pi$.

28. What is the period of the function $g(t) = \sin 4\pi t$?

29. If $g(t) = 20 \sin(200t)$, for how many values of t with $0 \leq t \leq 2\pi$ that $g(t) = 1$?

Section 7.3

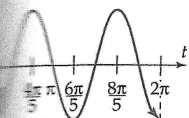
27.



28. $\frac{1}{2}$

29. 400

Section 7.4



30. What is the period of $f(t) = -\tan\left(\frac{t}{2}\right)$?
31. Which of the following statements is true?
 a. The amplitude of $f(t) = 3 \sin 2t + 1$ is 2.
 b. The period of $g(t) = -\frac{1}{2} \cos 2t$ is 4π .
 c. The period of $h(t) = 3 \tan 2t$ is $\frac{\pi}{2}$.
 d. The amplitude of $k(t) = -3 \tan t$ is 3.
32. What are the amplitude, period, and phase shift of the function $h(t) = 13 \cos(14t + 15)$?
33. State the rule of a sine function with amplitude 8, period 5, and phase shift 14.
34. State the rule of a sine function with amplitude 3, period π , and phase shift $\frac{\pi}{3}$.
35. State the rule of a periodic function whose graph from $t = 0$ to $t = 2\pi$ closely resembles the graph at left.

In Exercises 36–38, sketch the graph of at least one cycle of each function.

36. $f(t) = \frac{1}{2} \cos(2t - \pi) + 3$ 37. $g(t) = -\sin\left(\frac{1}{3}t + \pi\right)$
38. $g(t) = 4 \cos\left(\frac{2t}{3}\right) - 5$

In Exercises 39–42, determine graphically whether the given equation could possibly be an identity.

39. $\cos t = \sin\left(t - \frac{\pi}{2}\right)$ 40. $\tan \frac{t}{2} = \frac{\sin t}{1 + \cos t}$
41. $\frac{\sin t - \sin 3t}{\cos t + \cos 3t} = -\tan t$ 42. $\cos 2t = \frac{1}{1 - 2 \sin^2 t}$

Section 7.4.A

In Exercises 43 and 44, find a sine function whose graph looks like the graph of the given function.

43. $f(t) = 6 \sin(4t + 7) - 5 \cos(4t + 8)$
44. $f(t) = -5 \sin(5t - 3) + 2 \cos(5t + 2)$

In Exercises 45 and 46, find a viewing window that shows a complete graph of the function.

45. $f(t) = 3 \sin(300t + 5) - 2 \cos(500t + 8)$
46. $g(t) = -5 \sin(400\pi t + 1) + 2 \cos(150\pi t - 6)$

30. 2π

31. c

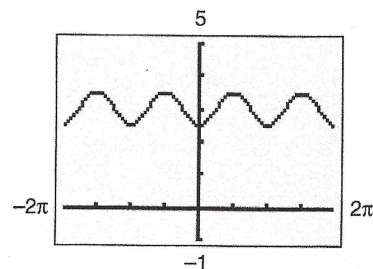
32. $13; \frac{\pi}{7}; -\frac{15}{14}$

33. $f(t) = 8 \sin\left(\frac{2\pi t - 28\pi}{5}\right)$

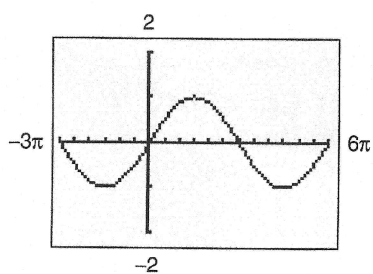
34. $f(t) = 3 \sin\left(2t - \frac{2\pi}{3}\right)$

35. $f(t) = 2 \cos\left(\frac{5t}{2}\right)$

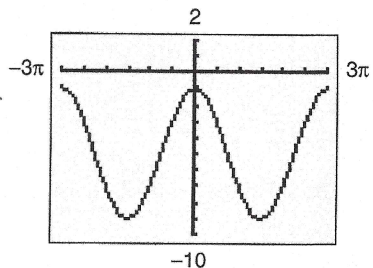
36.



37.



38.



39. not an identity
40. possibly an identity
41. possibly an identity
42. not an identity
43. $f(t) = 10.5588 \sin(4t + 0.4580)$
44. $f(t) = 3.134 \sin(5t - 0.0404)$
45. $0 \leq t \leq \frac{\pi}{50}$ and $-5 \leq y \leq 5$
(one period)
46. $0 \leq t \leq 0.04$ and $-7 \leq y \leq 7$