EXERCISE 3.6

A *Sketch a graph of each of the following without looking at the text or using a calculator.*

1. $y = \tan x, \quad 0 \le x \le 2\pi$
2. $y = \cot x, \quad 0 < x < 2\pi$
3. $y = \csc x, \quad -\pi < x < \pi$
4. $y = \sec x, \quad -\pi \le x \le \pi$

B *In Problems 5–10, indicate the period of each function, and sketch a graph of the function over the indicated interval.*

5. $y = 3 \tan 2x, \quad -\pi \le x \le \pi$
6. $y = 2 \cot 4x, \quad 0 < x < \pi/2$
7. $y = \frac{1}{2} \tan(x/2), \quad -\pi < x < 3\pi$
8. $y = \frac{1}{2} \cot(x/2), \quad 0 < x < 4\pi$
9. $y = 2 \csc(x/2), \quad 0 < x < 8\pi$
10. $y = 2 \sec \pi x, \quad -1 < x < 3$

Check the graphs in Problems 5–10 on a graphing utility.

In Problems 11–14, indicate the period and phase shift for each function, and sketch a graph of the function over the indicated interval.

11. $y = \cot(2x - \pi), \quad -\frac{\pi}{2} < x < \frac{\pi}{2}$
12. $y = \tan(2x + \pi), \quad -\frac{3\pi}{4} < x < \frac{3\pi}{4}$
13. $y = \csc\left(\pi x - \frac{\pi}{2}\right), \quad -\frac{1}{2} < x < \frac{5}{2}$
14. $y = \sec\left(\pi x + \frac{\pi}{2}\right), \quad -1 < x < 1$

Check the graphs in Problems 11–14 on a graphing utility.

Graph each equation in Problems 15–18 on a graphing utility; then find an equation of the form $y = A \tan Bx$, $y = A \cot Bx$, $y = A \csc Bx$, or $y = A \sec Bx$ that has the same graph. (These problems suggest additional identities beyond the fundamental ones that were discussed in Section 2.6—additional important identities will be discussed in detail in Chapter 4.)

15. $y = \csc x - \cot x$
16. $y = \csc x + \cot x$
17. $y = \cot x + \tan x$
18. $y = \cot x - \tan x$

C *In Problems 19–22, indicate the period and phase shift for each function, and sketch a graph of the function over the indicated interval.*

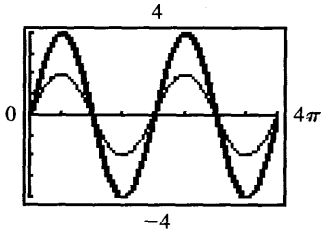
19. $y = -3 \cot(\pi x - \pi), \quad -2 < x < 2$
20. $y = -2 \tan\left(\frac{\pi}{4} x - \frac{\pi}{4}\right), \quad -1 < x < 7$
21. $y = 2 \sec\left(\pi x - \frac{\pi}{2}\right), \quad -1 < x < 3$
22. $y = 3 \csc\left(\frac{\pi}{2} x + \frac{\pi}{2}\right), \quad -1 < x < 3$

Check the graphs in Problems 19–22 on a graphing utility.

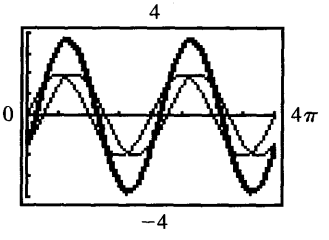
Graph each equation in Problems 23–26 on a graphing utility; then find an equation of the form $y = A \tan Bx$, $y = A \cot Bx$, $y = A \csc Bx$, or $y = A \sec Bx$ that has the same graph. (These problems suggest additional identities beyond the fundamental ones that were discussed in Section 2.6—additional important identities will be discussed in detail in Chapter 4.)

23. $y = \cos 2x + \sin 2x \tan 2x$
24. $y = \sin 3x + \cos 3x \cot 3x$
25. $y = \dfrac{\sin 6x}{1 - \cos 6x}$
26. $y = \dfrac{\sin 4x}{1 + \cos 4x}$

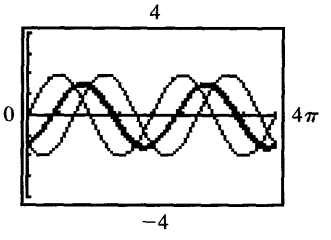
21. (A) Constructive



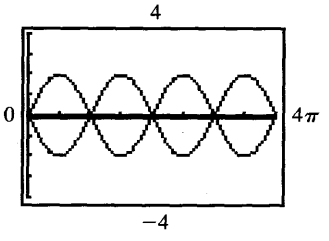
(B) Constructive



(C) Destructive

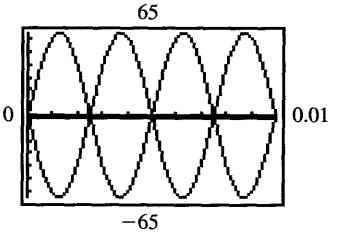


(D) Destructive



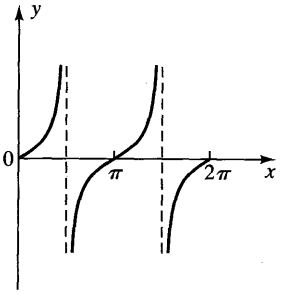
23. (A) $y_2 = 65 \sin(400\pi t - \pi)$

(B) y_2 added to y_1 produces a sound wave of 0 amplitude—no noise.

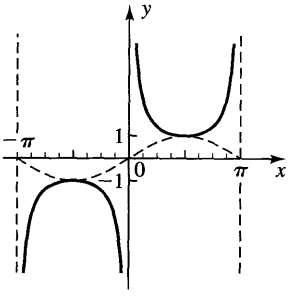


Exercise 3.6

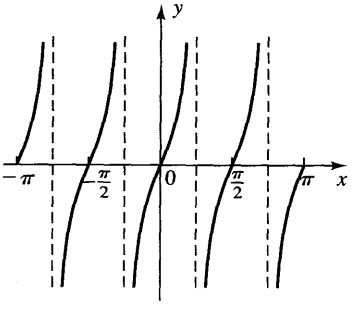
1.



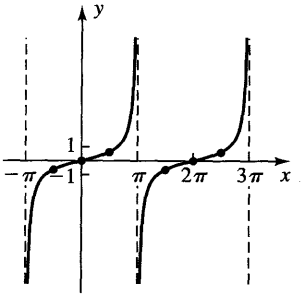
3.



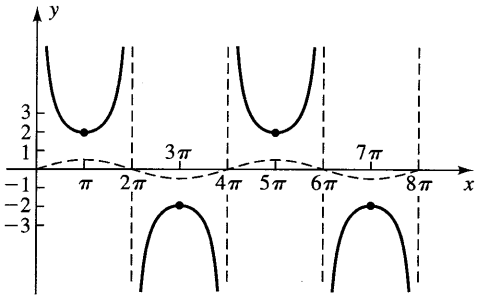
5. Period = $\pi/2$



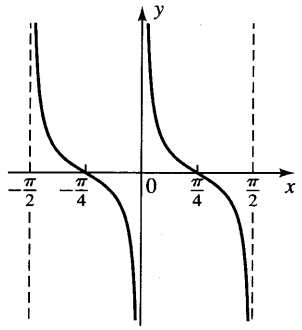
7. Period = 2π



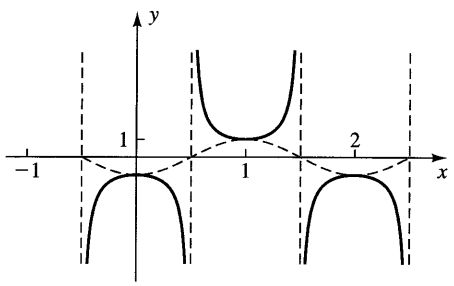
9. Period $= 4\pi$



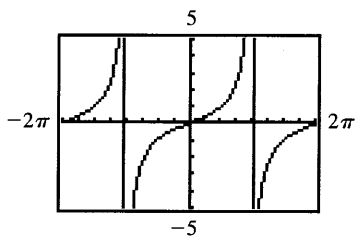
11. Period $= \pi/2$; Phase shift $= \pi/2$



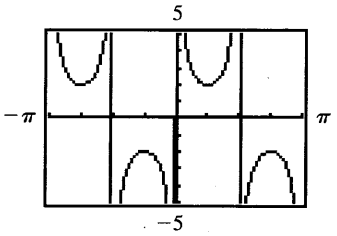
13. Period $= 2$; Phase shift $= \frac{1}{2}$



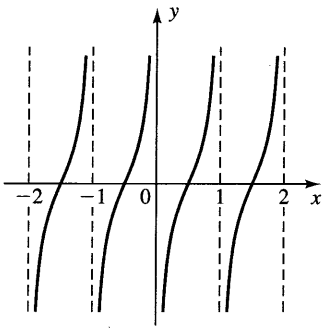
15. $y = \tan\dfrac{x}{2}$



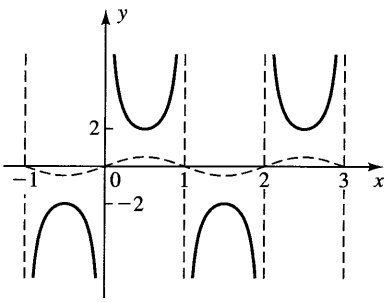
17. $y = 2 \csc 2x$



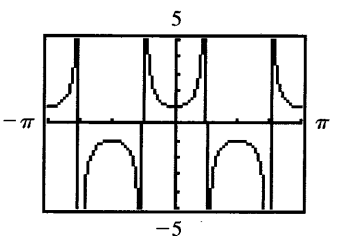
19. Period $= 1$; Phase shift $= 1$



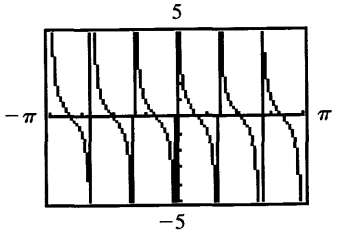
21. Period $= 2$; Phase shift $= \frac{1}{2}$



23. $y = \sec 2x$

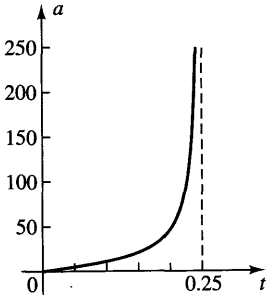


25. $y = \cot 3x$



27. (A) $a = 15 \tan 2\pi t$

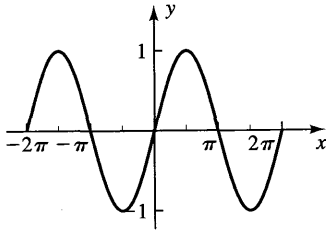
(B)



(C) a increases without bound.

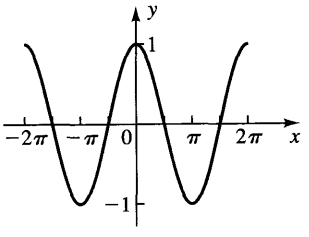
Chapter 3 Review Exercise

1.



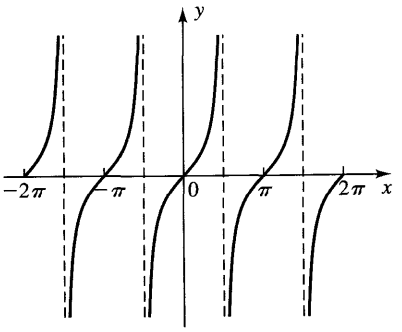
[3.1]

2.



[3.1]

3.



[3.1]

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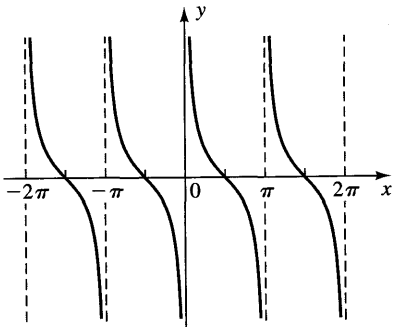
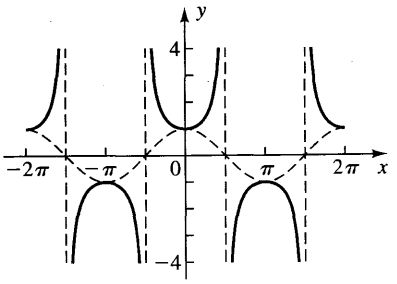


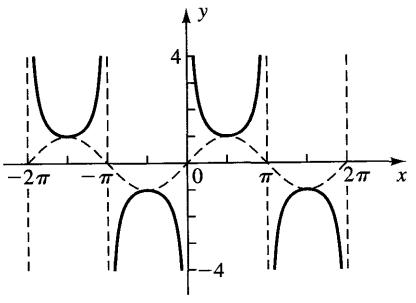
[3.1]

5.



[3.1]

6.



[3.1]