65. Maximum value 1.76 when $x \approx 0.94$, minimum value -1.76 when $x \approx -0.94$ (The same maximum and minimum values occur at infinitely many other values of x.)

66. Maximum value 6.97 when $x \approx 5.24$, minimum value -0.68 when $x \approx 1.05$ (The same maximum and minimum values occur at infinitely many other values of x.)

67. Maximum value 3.00 when $x \approx 1.57$, minimum value -1.00 when $x \approx -1.57$ (The same maximum and minimum values occur at infinitely many other values of x.)

68. Maximum value 0.58 when $x \approx 5.76$ (exact value is $x = 11\pi/6$; Minimum value -0.58 when $x \approx 3.67$ (exact value is $x = 7\pi/6$) (The same maximum and minimum values occur at infinitely many other values of x.)

69. 1.16   **70.** 1.11   **71.** 0.34, 2.80   **72.** 0.74

73. (a) Odd   (b) $0, \pm 2\pi, \pm 4\pi, \pm 6\pi, \ldots$

(c)
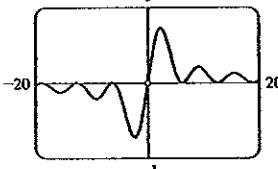
(d) $f(x)$ approaches 0

(e) $f(x)$ approaches 0

74. (a) Even

(b) $0, \pm \pi/4, \pm 2\pi/4, \pm 3\pi/4, \ldots$

(c)
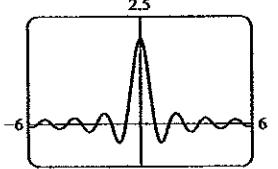
(d) $f(x)$ approaches 0

(e) $f(x)$ approaches 2

75. (a) 20 s   (b) 6 ft

76. (a) $\frac{1}{440}$ s   (b) 440   (c)

77. (a) $\frac{1}{80}$ min   (b) 80

(c)

(d) $\frac{140}{90}$; it is higher than normal
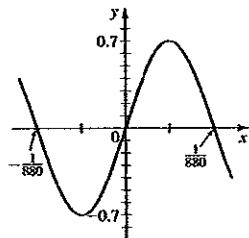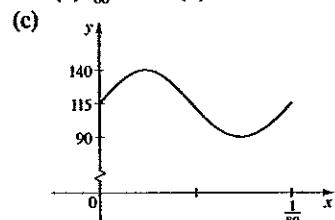
78. (a) 312 days   (b) 10, 5.8   (c)
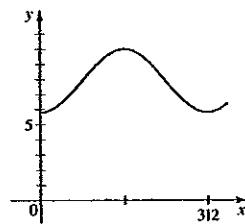
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**1.** II   **2.** III   **3.** VI   **4.** I   **5.** IV   **6.** V

7. π **8.** π
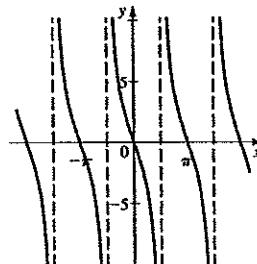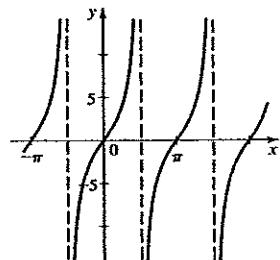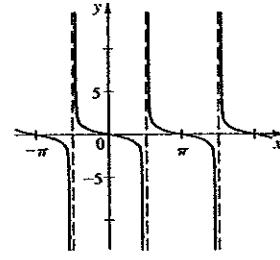
9. π **10.** π

11. π **12.** π

13. 2π **14.** 2π

4.4

15. 2π

16. 2π

25. $\pi/2$

26. 2π

17. π

18. π

27. 4

28. 2

19. 2π

20. 2π

29. π

30. $2\pi/3$

21. π

22. 2π

31. π

32. 4π

23. 2π

24. 2π
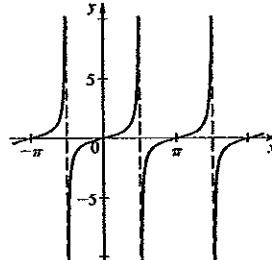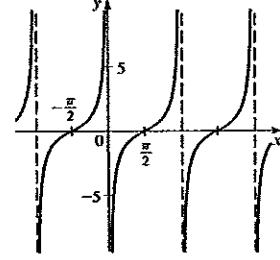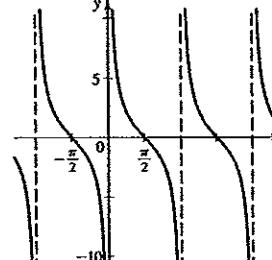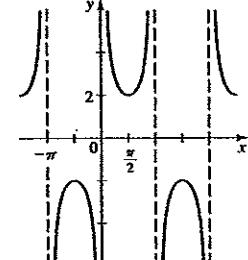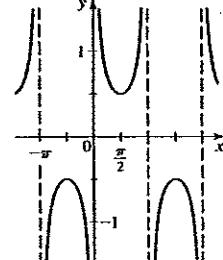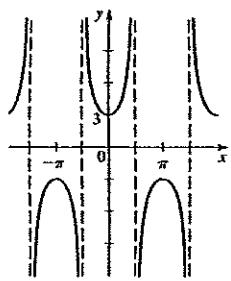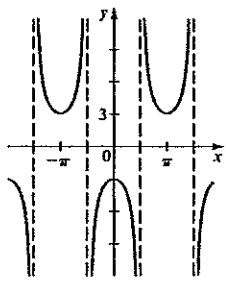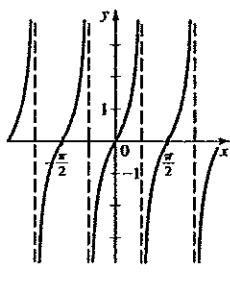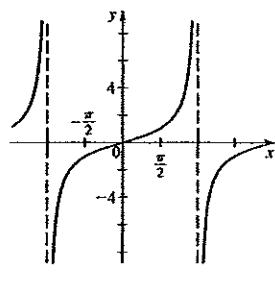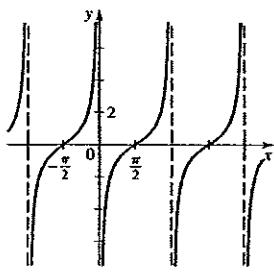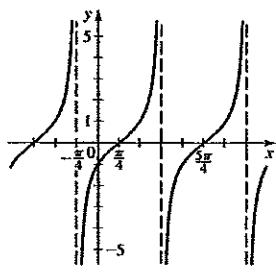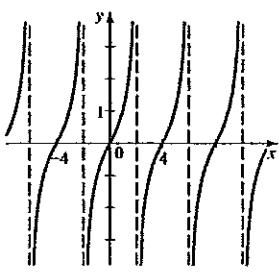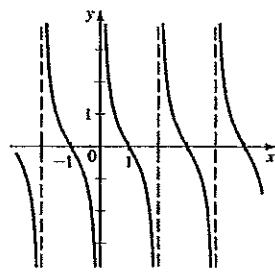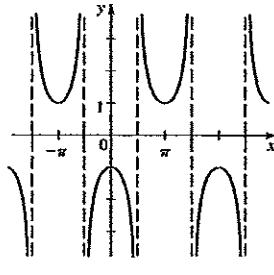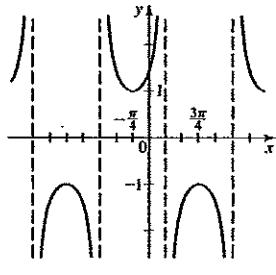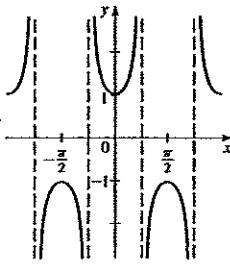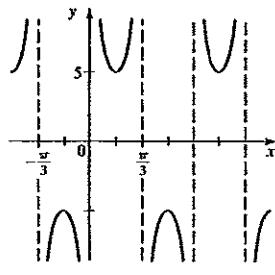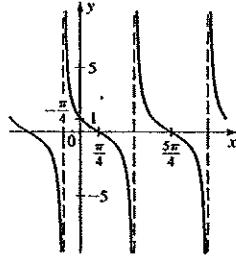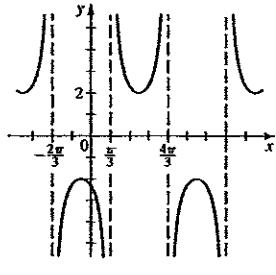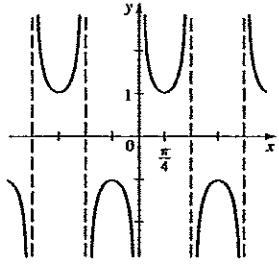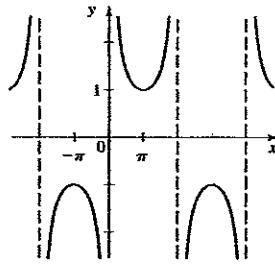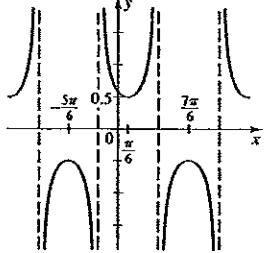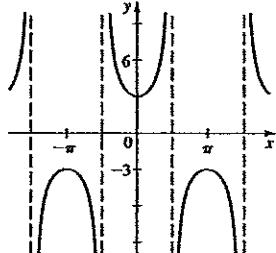
33. $\frac{1}{3}$
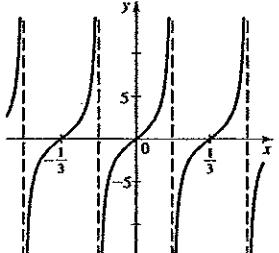
34. 2
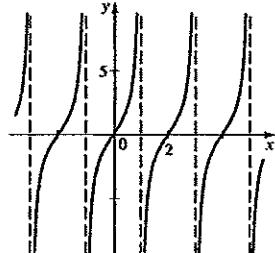
56. (a) $S(2) = 10.39$ ft, $S(8) = 3.46$ ft, $S\left(11\frac{3}{4}\right) = 91.54$ ft, $S(12)$ is undefined

(b)
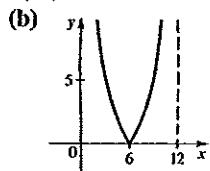
(c) 3, 9; 9:00 A.M., 3:00 P.M.

**(d)** The shadow gets increasingly longer.

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1. (a) $2, 2\pi/3, 3/(2\pi)$

(b)

2. (a) $3, 4\pi, 1/(4\pi)$

(b)

3. (a) $1, 20\pi/3, 3/(20\pi)$

(b)

4. (a) $2.4, 5\pi/9, 9/(5\pi)$

(b)
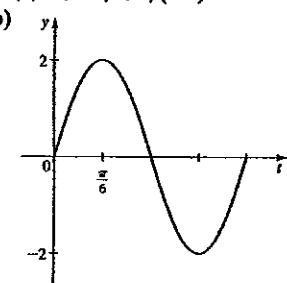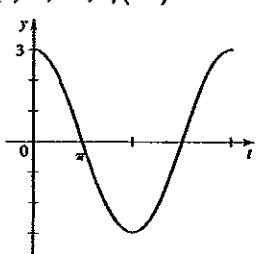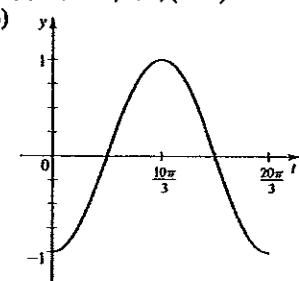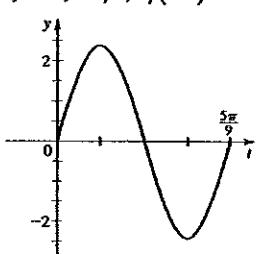
5. (a) $\frac{1}{4}, 4\pi/3, 3/(4\pi)$ **(b)**
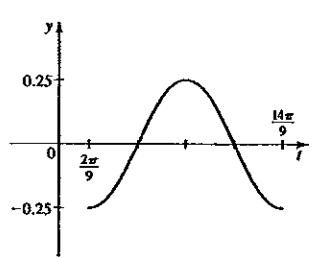
6. (a) $\frac{3}{2}, 10\pi, 1/(10\pi)$ **(b)**
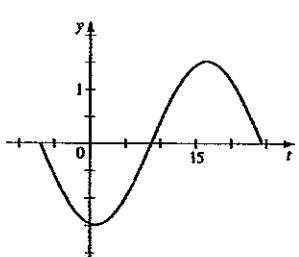
7. (a) $5, 3\pi, 1/(3\pi)$ **(b)**
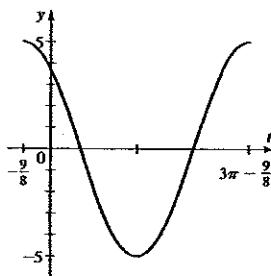
8. (a) $1.6, 2\pi, 1/(2\pi)$ **(b)**
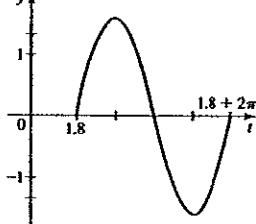
9. $y = 10 \sin\left(\dfrac{2\pi}{3}t\right)$ **10.** $y = 24 \sin(\pi t)$ **11.** $y = 6 \sin(10t)$

12. $y = 1.2 \sin(\pi t)$ **13.** $y = 60 \cos(4\pi t)$ **14.** $y = 35 \cos(\frac{1}{4}\pi t)$

15. $y = 2.4 \cos(1500\pi t)$ **16.** $y = 6.25 \cos(120\pi t)$

17. (a) $y = 2e^{-1.5t} \cos 6\pi t$ **(b)**

18. (a) $y = 15e^{-0.25t} \cos(1.2\pi t)$

(b)

19. (a) $y = 100e^{-0.05t} \cos \dfrac{\pi}{2}t$

(b)