4.2 Exercises

See www.CalcChat.com for worked-out solutions to odd-numbered exercises.

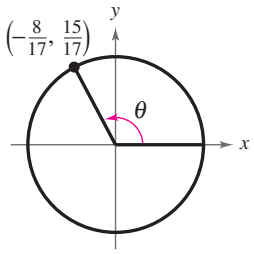
Vocabulary Check

Fill in the blanks.

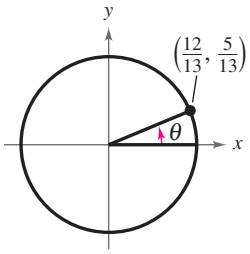
1. Each real number t corresponds to a point (x, y) on the _____ .
2. A function f is _____ if there exists a positive real number c such that $f(t + c) = f(t)$ for all t in the domain of f.
3. A function f is _____ if $f(-t) = -f(t)$ and _____ if $f(-t) = f(t)$.

In Exercises 1–4, determine the exact values of the six trigonometric functions of the angle θ.

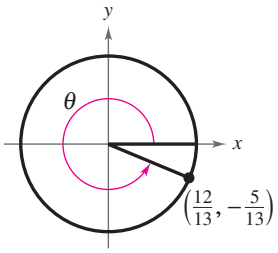
1.



2.



3.



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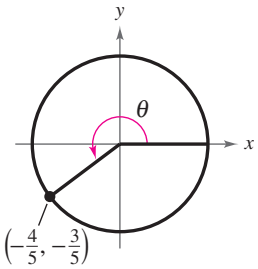

In Exercises 5–16, find the point (x, y) on the unit circle that corresponds to the real number t.

5. $t = \frac{\pi}{4}$
6. $t = \frac{\pi}{3}$
7. $t = \frac{7\pi}{6}$
8. $t = \frac{5\pi}{4}$
9. $t = \frac{2\pi}{3}$
10. $t = \frac{5\pi}{3}$
11. $t = \frac{3\pi}{2}$
12. $t = \pi$
13. $t = -\frac{7\pi}{4}$
14. $t = -\frac{4\pi}{3}$
15. $t = -\frac{3\pi}{2}$
16. $t = -2\pi$

In Exercises 17–30, evaluate (if possible) the sine, cosine, and tangent of the real number.

17. $t = \frac{\pi}{4}$
18. $t = \frac{\pi}{3}$
19. $t = \frac{7\pi}{6}$
20. $t = -\frac{5\pi}{4}$
21. $t = \frac{2\pi}{3}$
22. $t = \frac{5\pi}{3}$
23. $t = -\frac{5\pi}{3}$
24. $t = \frac{11\pi}{6}$
25. $t = -\frac{\pi}{6}$
26. $t = -\frac{3\pi}{4}$
27. $t = -\frac{7\pi}{4}$
28. $t = -\frac{4\pi}{3}$
29. $t = -\frac{3\pi}{2}$
30. $t = -2\pi$

In Exercises 31–36, evaluate (if possible) the six trigonometric functions of the real number.

31. $t = \frac{3\pi}{4}$
32. $t = \frac{5\pi}{6}$
33. $t = \frac{\pi}{2}$
34. $t = \frac{3\pi}{2}$
35. $t = -\frac{2\pi}{3}$
36. $t = -\frac{7\pi}{4}$

In Exercises 37–44, evaluate the trigonometric function using its period as an aid.

37. $\sin 5\pi$
38. $\cos 7\pi$
39. $\cos\frac{8\pi}{3}$
40. $\sin\frac{9\pi}{4}$
41. $\cos\left(-\frac{13\pi}{6}\right)$
42. $\sin\left(-\frac{19\pi}{6}\right)$
43. $\sin\left(-\frac{9\pi}{4}\right)$
44. $\cos\left(-\frac{8\pi}{3}\right)$

In Exercises 45–50, use the value of the trigonometric function to evaluate the indicated functions.

45. $\sin t = \frac{1}{3}$
(a) $\sin(-t)$
(b) $\csc(-t)$

46. $\cos t = -\frac{3}{4}$
(a) $\cos(-t)$
(b) $\sec(-t)$

47. $\cos(-t) = -\frac{1}{5}$
(a) $\cos t$
(b) $\sec(-t)$

48. $\sin(-t) = \frac{3}{8}$
(a) $\sin t$
(b) $\csc t$

49. $\sin t = \frac{4}{5}$
(a) $\sin(\pi - t)$
(b) $\sin(t + \pi)$

50. $\cos t = \frac{4}{5}$
(a) $\cos(\pi - t)$
(b) $\cos(t + \pi)$

In Exercises 51–68, use a calculator to evaluate the trigonometric expression. Round your answer to four decimal places.

51. $\sin \frac{7\pi}{9}$

52. $\tan \frac{2\pi}{5}$

53. $\cos \frac{11\pi}{5}$

54. $\sin \frac{11\pi}{9}$

55. $\csc 1.3$

56. $\cot 3.7$

57. $\cos(-1.7)$

58. $\cos(-2.5)$

59. $\csc 0.8$

60. $\sec 1.8$

61. $\sec 22.8$

62. $\sin(-13.4)$

63. $\cot 2.5$

64. $\tan 1.75$

65. $\csc(-1.5)$

66. $\tan(-2.25)$

67. $\sec(-4.5)$

68. $\csc(-5.2)$

Estimation **In Exercises 69 and 70, use the figure and a straightedge to approximate the value of each trigonometric function. Check your approximation using a graphing utility. To print an enlarged copy of the graph, go to the website *www.mathgraphs.com*.**

69. (a) $\sin 5$ (b) $\cos 2$

70. (a) $\sin 0.75$ (b) $\cos 2.5$

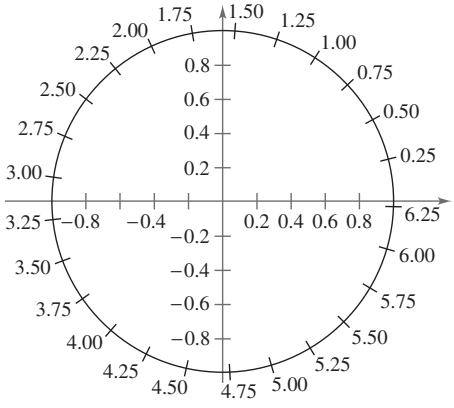

Figure for 69–72

Estimation **In Exercises 71 and 72, use the figure and a straightedge to approximate the solution of each equation, where $0 \le t < 2\pi$. Check your approximation using a graphing utility. To print an enlarged copy of the graph, go to the website *www.mathgraphs.com*.**

71. (a) $\sin t = 0.25$ (b) $\cos t = -0.25$

72. (a) $\sin t = -0.75$ (b) $\cos t = 0.75$

73. ***Electrical Circuits*** The initial current and charge in an electrical circuit are zero. The current when 100 volts is applied to the circuit is given by

$$I = 5e^{-2t} \sin t$$

where the resistance, inductance, and capacitance are 80 ohms, 20 henrys, and 0.01 farad, respectively. Approximate the current (in amperes) $t = 0.7$ second after the voltage is applied.

74. ***Electrical Circuits*** Approximate the current (in amperes) in the electrical circuit in Exercise 73 $t = 1.4$ seconds after the voltage is applied.

75. ***Harmonic Motion*** The displacement from equilibrium of an oscillating weight suspended by a spring is given by

$$y(t) = \frac{1}{4}\cos 6t$$

where y is the displacement (in feet) and t is the time (in seconds) (see figure). Find the displacement when (a) $t = 0$, (b) $t = \frac{1}{4}$, and (c) $t = \frac{1}{2}$.