

In Exercises 29–36, evaluate the trigonometric function of the quadrant angle.

29. $\sin \pi$ 0
 30. $\csc \frac{3\pi}{2}$ -1
 31. $\sec \frac{3\pi}{2}$ undef
 32. $\sec \pi$ -1
 33. $\sin \frac{\pi}{2}$ 1
 34. $\cot \pi$ undef
 35. $\csc \pi$ un
 36. $\cot \frac{\pi}{2}$ 0

In Exercises 37–44, find the reference angle θ' , and sketch θ and θ' in standard position.

37. $\theta = 203^\circ$
 38. $\theta = 309^\circ$
 39. $\theta = -245^\circ$
 40. $\theta = -145^\circ$
 41. $\theta = \frac{2\pi}{3}$
 42. $\theta = \frac{7\pi}{4}$
 43. $\theta = 3.5$
 44. $\theta = \frac{11\pi}{3}$

In Exercises 45–58, evaluate the sine, cosine, and tangent of the angle without using a calculator.

45. 225°
 46. 300°
 47. 750°
 48. -405°
 49. -150°
 50. -840°
 51. $\frac{4\pi}{3}$
 52. $\frac{\pi}{4}$
 53. $-\frac{\pi}{6}$
 54. $-\frac{\pi}{2}$
 55. $\frac{11\pi}{4}$
 56. $\frac{10\pi}{3}$
 57. $-\frac{3\pi}{2}$
 58. $-\frac{25\pi}{4}$

In Exercises 59–64, find the indicated trigonometric value in the specified quadrant.

- | Function | Quadrant | Trigonometric Value |
|----------------------------------|----------|---------------------|
| 59. $\sin \theta = -\frac{3}{5}$ | IV | $\cos \theta$ |
| 60. $\cot \theta = -3$ | II | $\sin \theta$ |
| 61. $\tan \theta = \frac{1}{2}$ | III | $\sec \theta$ |
| 62. $\csc \theta = -2$ | IV | $\cot \theta$ |
| 63. $\cos \theta = \frac{5}{8}$ | I | $\sec \theta$ |
| 64. $\sec \theta = -\frac{9}{4}$ | III | $\tan \theta$ |

In Exercises 65–80, use a calculator to evaluate the trigonometric function. Round your answer to four decimal places. (Be sure the calculator is set in the correct angle mode.)

65. $\sin 10^\circ$
 66. $\sec 225^\circ$
 67. $\cos(-110^\circ)$
 68. $\csc(-330^\circ)$
 69. $\tan 304^\circ$
 70. $\cot 178^\circ$
 71. $\sec 72^\circ$
 72. $\tan(-188^\circ)$
 73. $\tan 4.5$
 74. $\cot 1.35$
 75. $\tan \frac{\pi}{9}$
 76. $\tan\left(-\frac{\pi}{9}\right)$
 77. $\sin(-0.65)$
 78. $\sec 0.29$
 79. $\cot\left(-\frac{11\pi}{8}\right)$
 80. $\csc\left(-\frac{15\pi}{14}\right)$

In Exercises 81–86, find two solutions of the equation. Give your answers in degrees ($0^\circ \leq \theta < 360^\circ$) and in radians ($0 \leq \theta < 2\pi$). Do not use a calculator.

81. (a) $\sin \theta = \frac{1}{2}$
 (b) $\sin \theta = -\frac{1}{2}$
 82. (a) $\cos \theta = \frac{\sqrt{2}}{2}$
 (b) $\cos \theta = -\frac{\sqrt{2}}{2}$
 83. (a) $\csc \theta = \frac{2\sqrt{3}}{3}$
 (b) $\cot \theta = -1$
 84. (a) $\sec \theta = 2$
 (b) $\sec \theta = -2$
 85. (a) $\tan \theta = 1$
 (b) $\cot \theta = -\sqrt{3}$
 86. (a) $\sin \theta = \frac{\sqrt{3}}{2}$
 (b) $\sin \theta = -\frac{\sqrt{3}}{2}$

Model It

87. **Data Analysis: Meteorology** The table shows the monthly normal temperatures (in degrees Fahrenheit) for selected months for New York City (N) and Fairbanks, Alaska (F). (Source: National Climatic Data Center)

| Month | New York City, N | Fairbanks, F |
|----------|--------------------|----------------|
| January | 33 | -10 |
| April | 52 | 32 |
| July | 77 | 62 |
| October | 58 | 24 |
| December | 38 | -6 |

- (a) Use the *regression* feature of a graphing utility to find a model of the form $y = a \sin(bt + c) + d$ for each city. Let t represent the month, with $t = 1$ corresponding to January.

Unit Circle

