65. $\theta = -\frac{17\pi}{6}$ coterminal with $\frac{7\pi}{6}$.

$\theta' = \frac{7\pi}{6} - \pi = \frac{\pi}{6}$

Quadrant III

$\sin\left(-\frac{17\pi}{6}\right) = -\sin\left(\frac{\pi}{6}\right) = -\frac{1}{2}$

$\cos\left(-\frac{17\pi}{6}\right) = -\cos\left(\frac{\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

$\tan\left(-\frac{17\pi}{6}\right) = \tan\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{3}$

67. $\sin\theta = -\frac{3}{5}$

$\sin^2\theta + \cos^2\theta = 1$

$\cos^2\theta = 1 - \sin^2\theta$

$\cos^2\theta = 1 - \left(-\frac{3}{5}\right)^2$

$\cos^2\theta = 1 - \frac{9}{25}$

$\cos^2\theta = \frac{16}{25}$

$\cos\theta > 0$ in Quadrant IV.

$\cos\theta = \frac{4}{5}$

69. $\tan\theta = \frac{3}{2}$

$\sec^2\theta = 1 + \tan^2\theta$

$\sec^2\theta = 1 + \left(\frac{3}{2}\right)^2$

$\sec^2\theta = 1 + \frac{9}{4}$

$\sec^2\theta = \frac{13}{4}$

$\sec\theta < 0$ in Quadrant III.

$\sec\theta = -\frac{\sqrt{13}}{2}$

71. $\cos\theta = \frac{5}{8}$

$\cos\theta = \frac{1}{\sec\theta} \Rightarrow \sec\theta = \frac{1}{\cos\theta}$

$\sec\theta = \frac{1}{5/8} = \frac{8}{5}$

73. $\sin 10° \approx 0.1736$

75. $\tan 245° \approx 2.1445$

77. $\cos(-110°) \approx -0.3420$

79. $\sec(-280°) = \frac{1}{\cos(-280°)}$

≈ 5.7588

81. $\sin 0.65 \approx 0.6052$

83. $\cos(-1.81) \approx -0.2369$

85. $\tan\left(\frac{2\pi}{9}\right) \approx 0.8391$

87. $\csc\left(-\frac{8\pi}{9}\right) = \frac{1}{\sin\left(-\frac{8\pi}{9}\right)} \approx -2.9238$

89. (a) $\sin\theta = \frac{1}{2} \Rightarrow$ reference angle is 30° or $\frac{\pi}{6}$ and θ is in Quadrant I or Quadrant II.

Values in degrees: 30°, 150°

Values in radian: $\frac{\pi}{6}, \frac{5\pi}{6}$

(b) $\sin\theta = -\frac{1}{2} \Rightarrow$ reference angle is 30° or $\frac{\pi}{6}$ and θ is in Quadrant III or Quadrant IV.

Values in degrees: 210°, 330°

Values in radians: $\frac{7\pi}{6}, \frac{11\pi}{6}$

91. (a) $\csc\theta = \dfrac{2\sqrt{3}}{3} \implies$ reference angle is 60° or $\dfrac{\pi}{3}$ and θ is in Quadrant I or Quadrant II.

Values in degrees: 60°, 120°

Values in radians: $\dfrac{\pi}{3}, \dfrac{2\pi}{3}$

(b) $\cot\theta = -1 \implies$ reference angle is 45° or $\dfrac{\pi}{4}$ and θ is in Quadrant II or Quadrant IV.

Values in degrees: 135°, 315°

Values in radians: $\dfrac{3\pi}{4}, \dfrac{7\pi}{4}$

93. (a) $\sec\theta = -\dfrac{2\sqrt{3}}{3} \implies$ reference angle is $\dfrac{\pi}{6}$ or 30°, and θ is in Quadrant II or Quadrant III.

Value in degrees: 150°, 210°

Value in radians: $\dfrac{5\pi}{6}, \dfrac{7\pi}{6}$

(b) $\cos\theta = \dfrac{1}{2}$

θ is in Quadrant I or Quadrant IV.

Value in degrees: 60°, 300°

Value in radians: $\dfrac{\pi}{3}, \dfrac{5\pi}{3}$

95. $\left(\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$ corresponds to $t = \dfrac{\pi}{4}$ on the unit circle.

$\sin\dfrac{\pi}{4} = \dfrac{\sqrt{2}}{2}$ since $\sin t = y$.

$\cos\dfrac{\pi}{4} = \dfrac{\sqrt{2}}{2}$ since $\cos t = x$.

$\tan\dfrac{\pi}{4} = 1$ since $\tan t = \dfrac{y}{x}$.

97. $\left(-\dfrac{\sqrt{3}}{2}, \dfrac{1}{2}\right)$ corresponds to $t = \dfrac{5\pi}{6}$ on the unit circle.

$\sin\dfrac{5\pi}{6} = \dfrac{1}{2}$ since $\sin t = y$.

$\cos\dfrac{5\pi}{6} = -\dfrac{\sqrt{3}}{2}$ since $\cos t = x$.

$\tan\dfrac{5\pi}{6} = -\dfrac{1}{\sqrt{3}} = \dfrac{-\sqrt{3}}{3}$ since $\tan t = \dfrac{y}{x}$.

99. $\left(-\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}\right)$ corresponds to $t = \dfrac{4\pi}{3}$ on the unit circle.

$\sin\dfrac{4\pi}{3} = -\dfrac{\sqrt{3}}{2}$ since $\sin t = y$.

$\cos\dfrac{4\pi}{3} = -\dfrac{1}{2}$ since $\cos t = x$.

$\tan\dfrac{4\pi}{3} = \sqrt{3}$ since $\tan t = \dfrac{y}{x}$.

101. $(0, -1)$ corresponds to $t = \dfrac{3\pi}{2}$ on the unit circle.

$\sin\dfrac{3\pi}{2} = -1$ since $\sin t = y$.

$\cos\dfrac{3\pi}{2} = 0$ since $\cos t = x$.

$\tan\dfrac{3\pi}{2}$ is undefined since $\tan t = \dfrac{y}{x}$.

103. (a) $\sin 5 \approx -1$

(b) $\cos 2 \approx -0.4$

105. (a) $\sin t = 0.25$

$t \approx 0.25$ or 2.89

(b) $\cos t = -0.25$

$t \approx 1.82$ or 4.46

107. $T = 49.5 + 20.5\cos\left(\dfrac{\pi t}{6} - \dfrac{7\pi}{6}\right)$

(a) January: $t = 1 \implies T = 49.5 + 20.5\cos\left(\dfrac{\pi(1)}{6} - \dfrac{7\pi}{6}\right) = 29°$

(b) July: $t = 7 \implies T = 70°$

(c) December: $t = 12 \implies T \approx 31.75°$

109. $y(t) = 2e^{-t}\cos 6t$

(a) $y(0) = 2e^{-0}\cos(6(0)) = 2$ cm

(b)

t	0.50	1.02	1.54	2.07	2.59
y	-1.2	0.71	-0.42	0.25	-0.15

(c) Friction within the system dampens the oscillations and is modeled by the factor e^{-t}.

(d) Using the zoom and trace feature, or root feature, you obtain $t = 0.26$ and $t = 0.79$.

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

$I(0.7) = 5e^{-1.4}\sin 0.7 \approx 0.79$ amperes

113. True. The reference angle for $\theta = 151°$ is $\theta' = 180° - 151° = 29°$, and sine is positive in Quadrants I and II.

115. True. The reference angle for $-7\pi/6$ is $\pi/6$ and the reference angle for $-11\pi/6$ is $\pi/6$. Since cosecant is positive in Quadrants I and II,

$$\csc\left(-\frac{7\pi}{6}\right) = \csc\left(-\frac{11\pi}{6}\right) = 2.$$

117. (a)

θ	0°	20°	40°	60°	80°
$\sin\theta$	0	0.3420	0.6428	0.8660	0.9848
$\sin(180° - \theta)$	0	0.3420	0.6428	0.8660	0.9848

(b) It appears that $\sin\theta = \sin(180° - \theta)$.

119.

Function	$\sin x$	$\cos x$	$\tan x$
Domain	$(-\infty, \infty)$	$(-\infty, \infty)$	All reals except $\frac{\pi}{2} + n\pi$
Range	$[-1, 1]$	$[-1, 1]$	$(-\infty, \infty)$
Evenness	No	Yes	No
Oddness	Yes	No	Yes
Period	2π	2π	π
Zeros	$n\pi$	$\frac{\pi}{2} + n\pi$	$n\pi$

Function	$\csc x$	$\sec x$	$\cot x$
Domain	All reals except $n\pi$	All reals except $\frac{\pi}{2} + n\pi$	All reals except $n\pi$
Range	$(-\infty, -1] \cup [1, \infty)$	$(-\infty, -1] \cup [1, \infty)$	$(-\infty, \infty)$
Evenness	No	Yes	No
Oddness	Yes	No	Yes
Period	2π	2π	π
Zeros	None	None	$\frac{\pi}{2} + n\pi$

Patterns and conclusions may vary.