Lesson 6.2: The Unit Circle

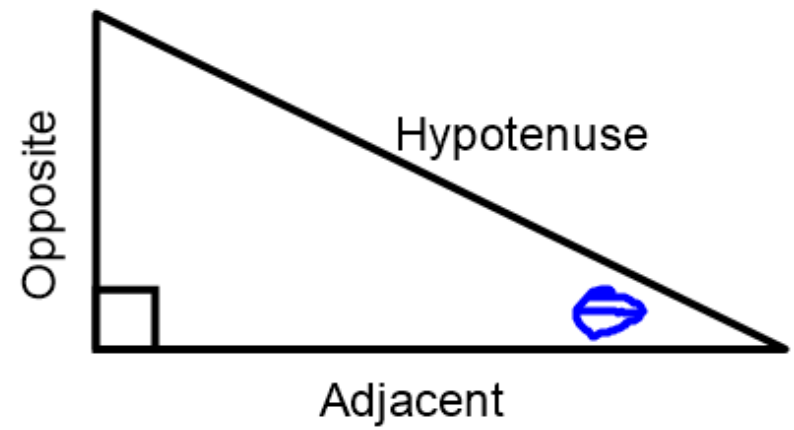
Trig Ratios

Soh cah toa

$$\sin\theta = \frac{opp}{hyp}$$

$$\cos\theta = \frac{adj}{hyp}$$

$$\tan\theta = \frac{opp}{adj}$$

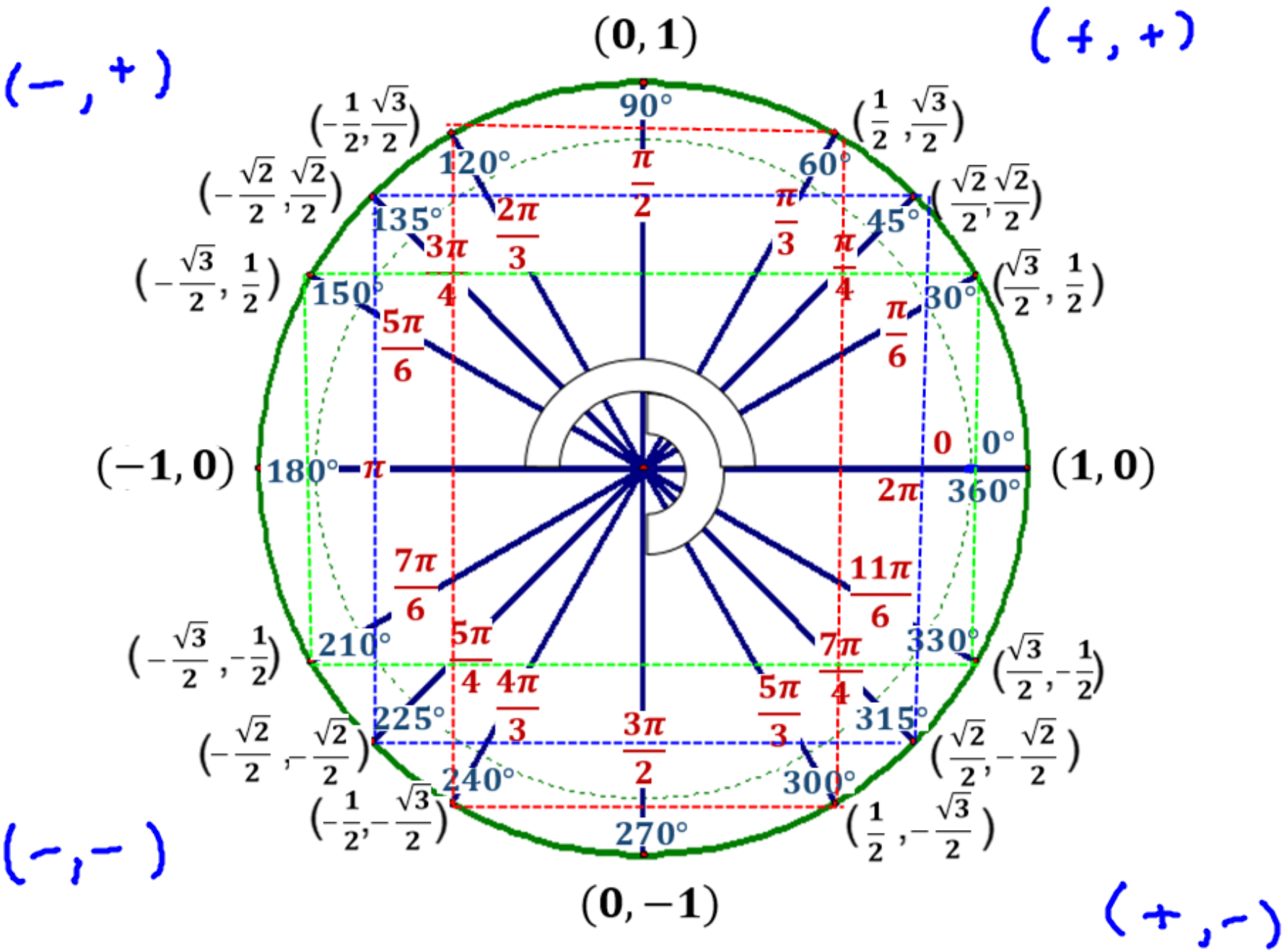


$$\frac{1}{\sin\theta} = \csc\theta = \frac{hyp}{opp}$$

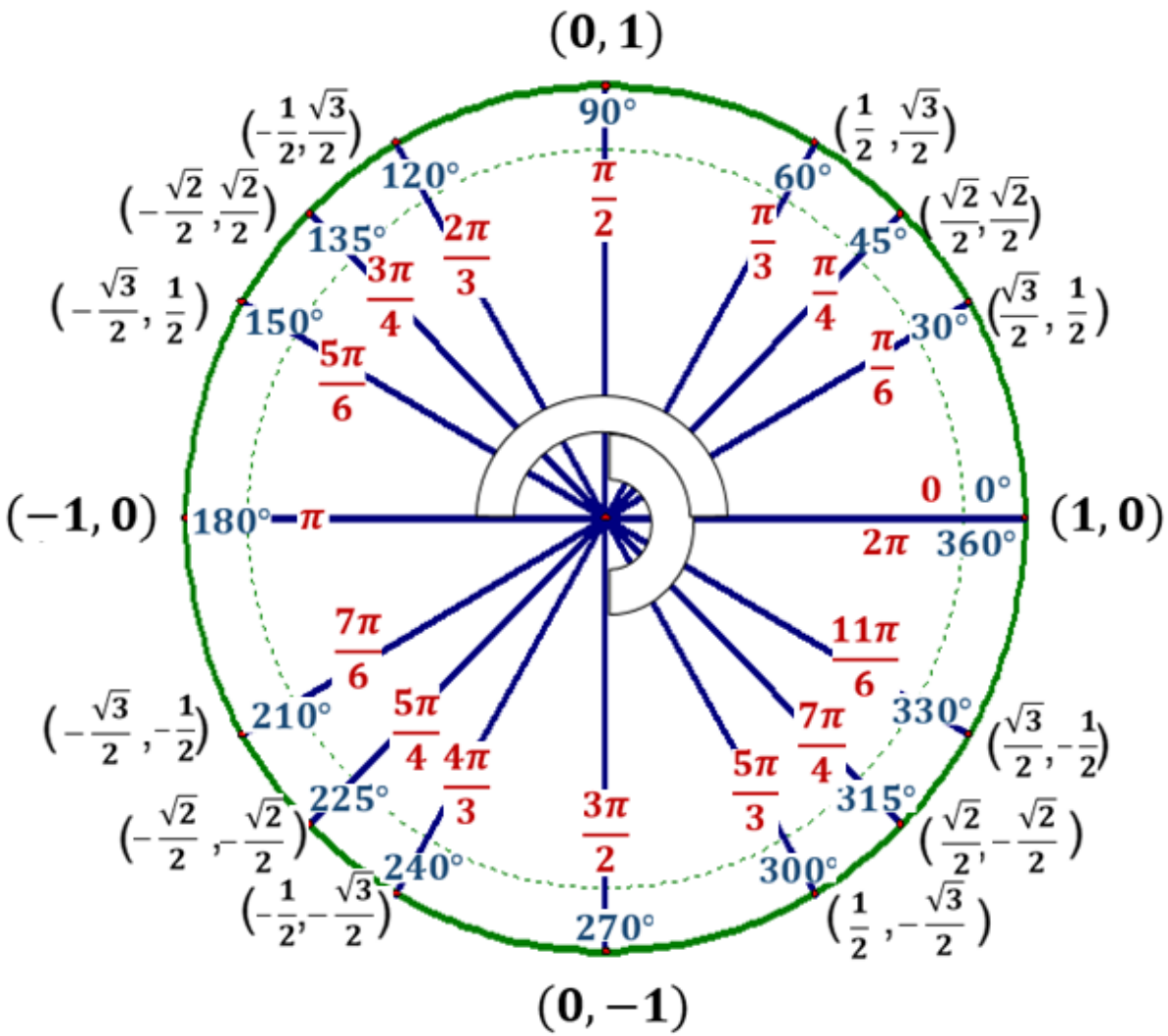
$$\frac{1}{\cos\theta} = \sec\theta = \frac{hyp}{adj}$$

$$\frac{1}{\tan\theta} = \cot\theta = \frac{adj}{opp}$$

Unit Circle

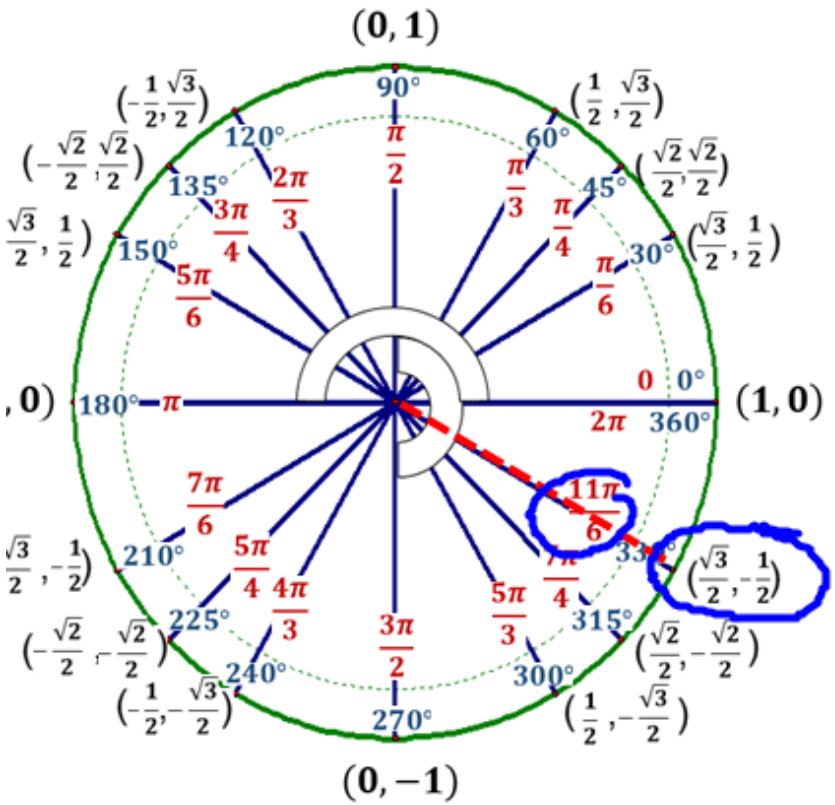

(0, 1)
(+, +)
(−, +)
90°
π/2
(1/2, √3/2)
(−1/2, √3/2)
120°
60°
(√2/2, √2/2)
(−√2/2, √2/2)
135°
45°
2π/3
π/3
3π/4
π/4
(√3/2, 1/2)
(−√3/2, 1/2)
150°
30°
5π/6
π/6
(−1, 0)
180°
π
0
0°
(1, 0)
2π
360°
7π/6
11π/6
(−√3/2, −1/2)
210°
330°
(√3/2, −1/2)
5π/4
7π/4
4π/3
5π/3
225°
315°
(−√2/2, −√2/2)
(√2/2, −√2/2)
3π/2
240°
300°
(−1/2, −√3/2)
(1/2, −√3/2)
270°
(0, −1)
(−, −)
(+, −)

*



$\cos\theta =$ x	$\sin\theta =$ y	$\tan\theta =$ $\frac{y}{x}$
$\sec\theta =$ $\frac{1}{x}$	$\csc\theta =$ $\frac{1}{y}$	$\cot\theta =$ $\frac{x}{y}$

Find all six trig values for the following angle: $\dfrac{11\pi}{6} = \theta$



$\sin\theta = -\dfrac{1}{2}$

$\cos\theta = \dfrac{\sqrt{3}}{2}$

$\tan\theta = \dfrac{-1/2}{\sqrt{3}/2} = -\dfrac{\sqrt{3}}{3}$

$\csc\theta = -2$

$\sec\theta = \dfrac{2}{\sqrt{3}} = \dfrac{2\sqrt{3}}{3}$

$\cot\theta = \dfrac{\sqrt{3}/2}{-1/2} = -\sqrt{3}$

$\dfrac{11\pi}{6} \rightarrow$

Periodic Property

$$\cos\theta = \cos(\theta + 2\pi n)$$

(applies to every trig function)

Odd/Even Properties

$$\cos(-\theta) = \cos\theta$$

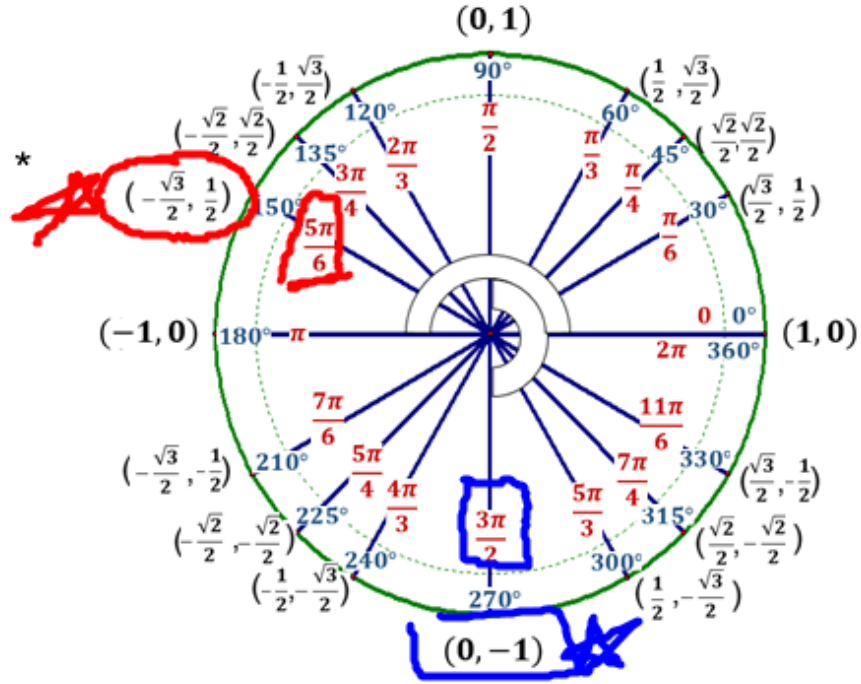
$$\sin(-\theta) = -\sin\theta$$

$$\tan(-\theta) = -\tan\theta$$

$$\sec(-\theta) = \sec\theta$$

$$\csc(-\theta) = -\csc\theta$$

$$\cot(-\theta) = -\cot\theta$$

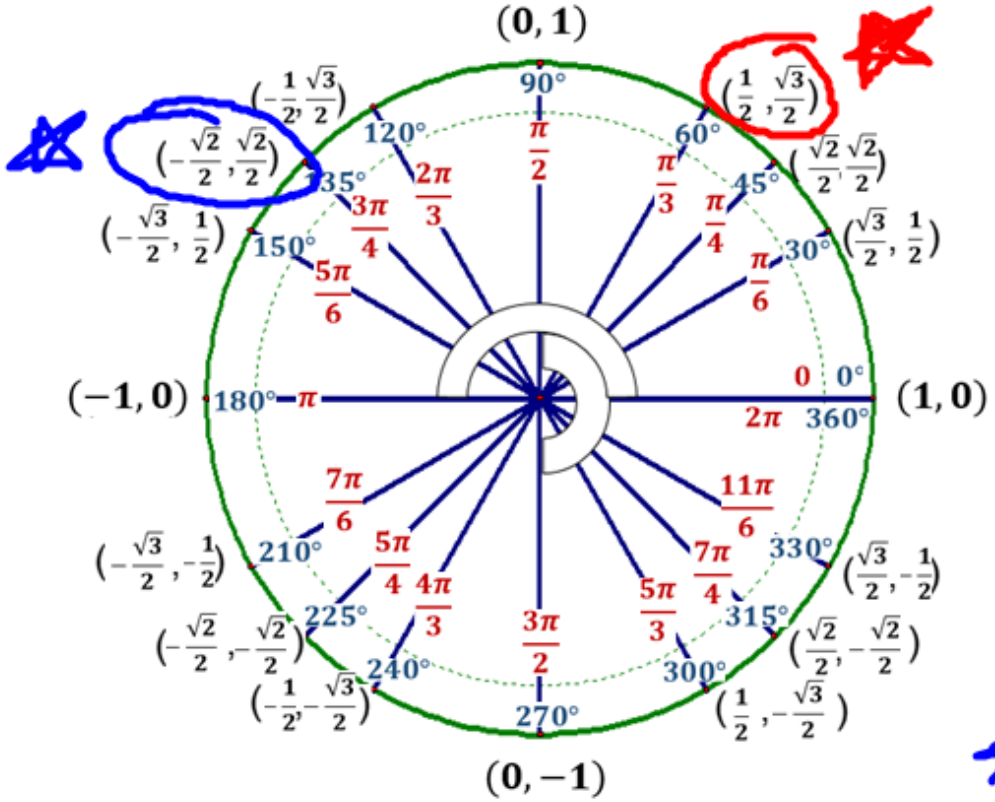


$$\cos\left(\frac{17\pi}{6}\right) = \cos\left(\frac{5\pi}{6}\right) = \boxed{-\frac{\sqrt{3}}{2}}$$

$$\frac{17}{6} - \frac{12}{6} = \frac{5}{6}$$

$$\tan\left(\frac{7\pi}{2}\right) = \tan\left(\frac{3\pi}{2}\right) = \frac{-1}{0} = \boxed{\text{und.}}$$

$$\frac{7\pi}{2} - \frac{4\pi}{2} = \frac{3\pi}{2}$$



$$\sin\left(-\frac{5\pi}{3}\right) = \sin\left(\frac{\pi}{3}\right) = \boxed{\frac{\sqrt{3}}{2}}$$

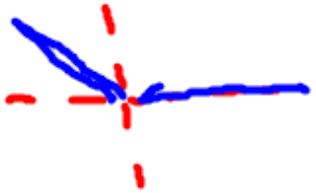
$$-\frac{5\pi}{3} + \frac{6\pi}{3} = \frac{\pi}{3}$$

$$\cot\left(-\frac{13\pi}{4}\right) = \cot\left(\frac{3\pi}{4}\right)$$

$$\frac{x}{y} = \frac{-\sqrt{2}/2}{\sqrt{2}/2} = \boxed{-1}$$

$$-\frac{13\pi}{4} + \frac{8\pi}{4} = -\frac{5\pi}{4}$$

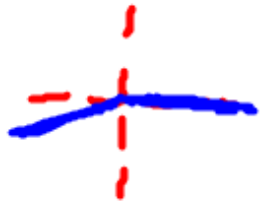
$$-\frac{5\pi}{4} + \frac{8\pi}{4} = \frac{3\pi}{4}$$

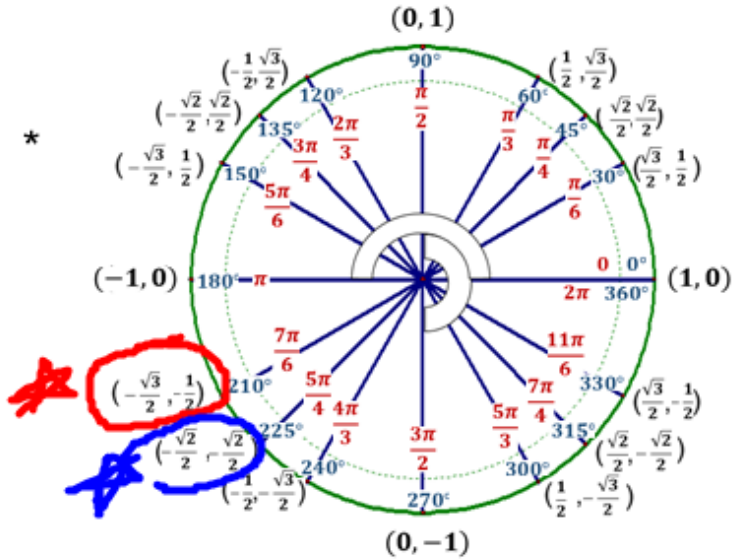


$$\sec\left(\frac{19\pi}{6}\right) = \sec\left(\frac{7\pi}{6}\right) = -\frac{2}{\sqrt{3}}$$

$\frac{1}{x}$

$$= -\frac{2\sqrt{3}}{3}$$





$$\csc\left(-\frac{11\pi}{4}\right) = \csc\left(\frac{5\pi}{4}\right) = -\frac{2}{\sqrt{2}} = -\frac{2\sqrt{2}}{2} = \boxed{-\sqrt{2}}$$