

Accelerated Pre-Calculus

1.13 Unit Circle and Trig Ratios

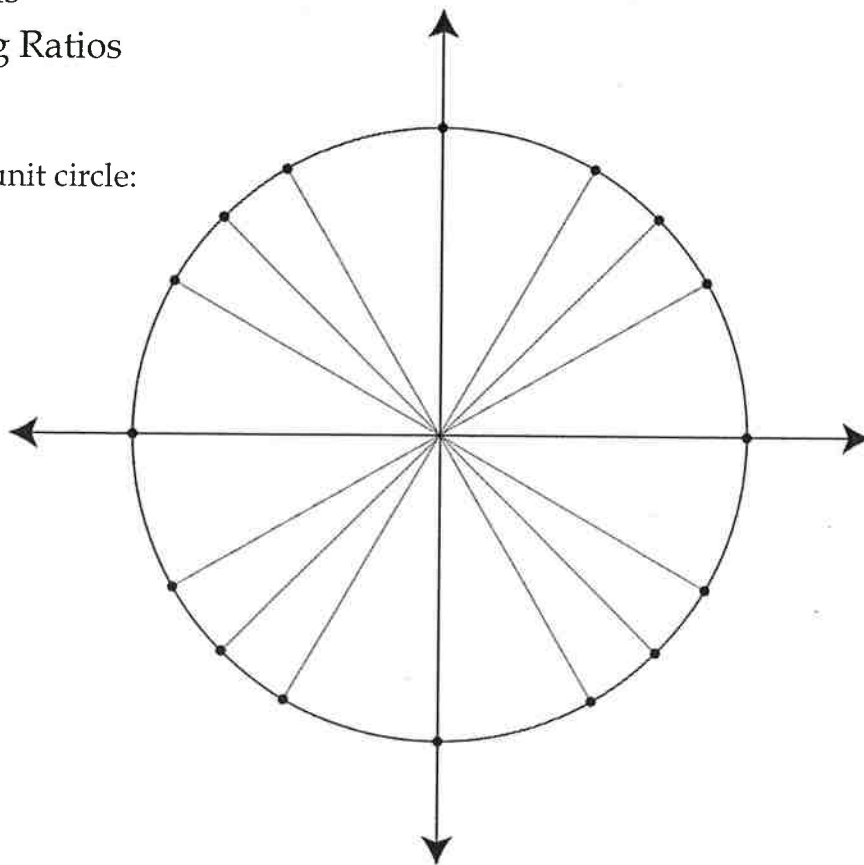
To find trig ratios from the unit circle:

Remember

$$x = \cos$$

$$y = \sin$$

$$y/x = \tan$$



Using the Unit Circle, find the following.

$$1. \sin 30^\circ = \frac{1}{2}$$

$$2. \cos 45^\circ = \frac{\sqrt{2}}{2}$$

$$3. \tan \frac{\pi}{6} = \frac{\sqrt{3}}{3}$$

$$4. \csc \frac{\pi}{3} = \frac{2\sqrt{3}}{3}$$

$$5. \cot 90^\circ = \frac{0}{1} = 0$$

$$6. \sec 270^\circ = \frac{1}{0} \rightarrow \text{undefined}$$

What about angles in other quadrants?

$$7. \cos \frac{2\pi}{3} = -\frac{1}{2}$$

$$8. \csc \frac{3\pi}{4} = \sqrt{2}$$

$$9. \cot 210^\circ = \sqrt{3}$$

$$10. \sin \frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$$

$$11. \tan 360^\circ = \frac{0}{1} = 0$$

$$12. \sec 330^\circ = \frac{2\sqrt{3}}{3}$$

What about angles outside of 0 to 2π ?

$$13. \cos \frac{11\pi}{3} = \frac{1}{2}$$

$$14. \sin(-390^\circ) = -\frac{1}{2}$$

sin 330

$$15. \tan 1305^\circ = 1$$

tan(225)

$$16. \csc \frac{19\pi}{6} = -2$$

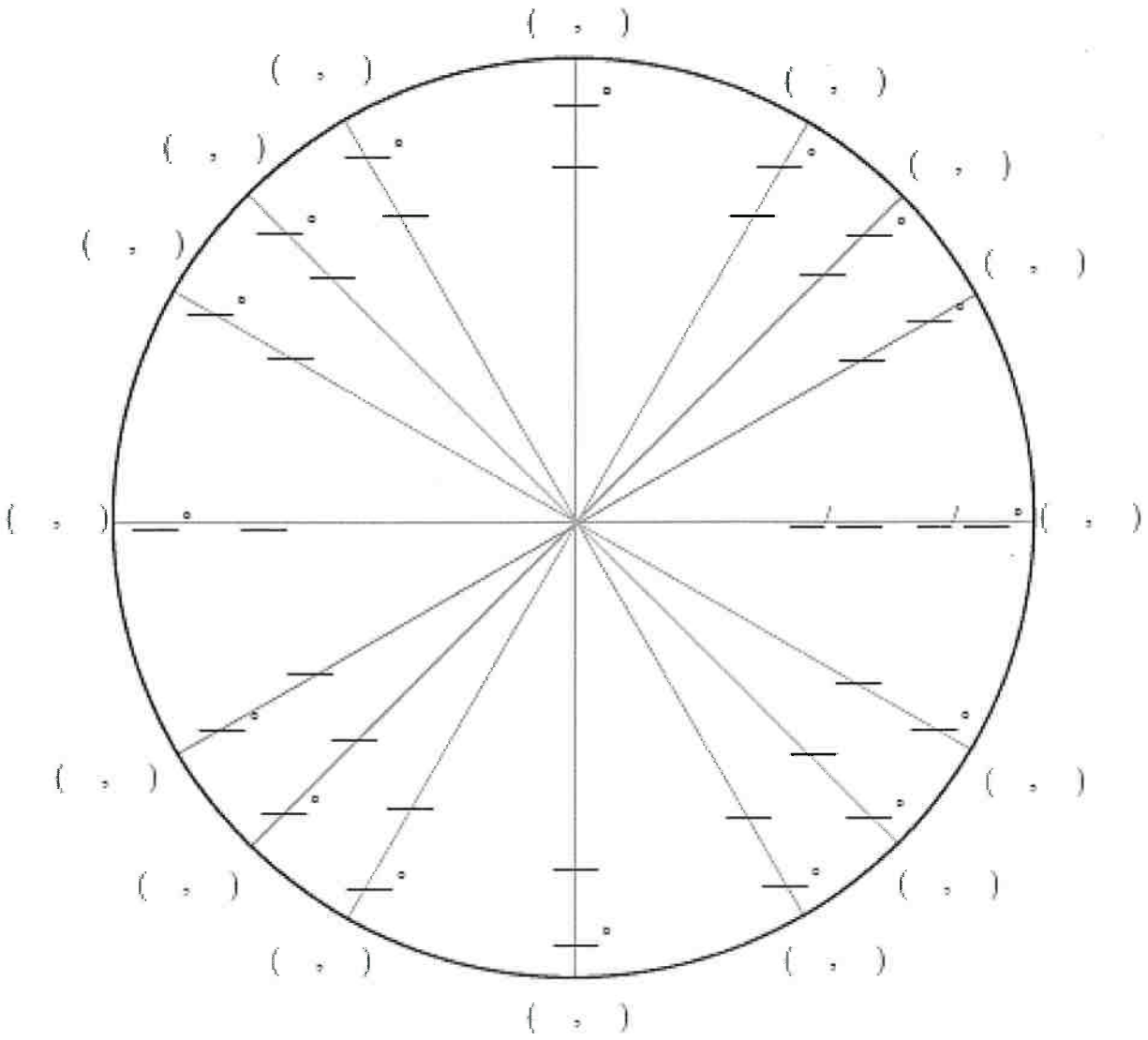
$$17. \sec(-135^\circ) = -\sqrt{2}$$

sec(225)

$$18. \cot\left(-\frac{3\pi}{2}\right) =$$

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

$$\cot\left(\frac{\pi}{2}\right) = \frac{0}{1} = 0$$

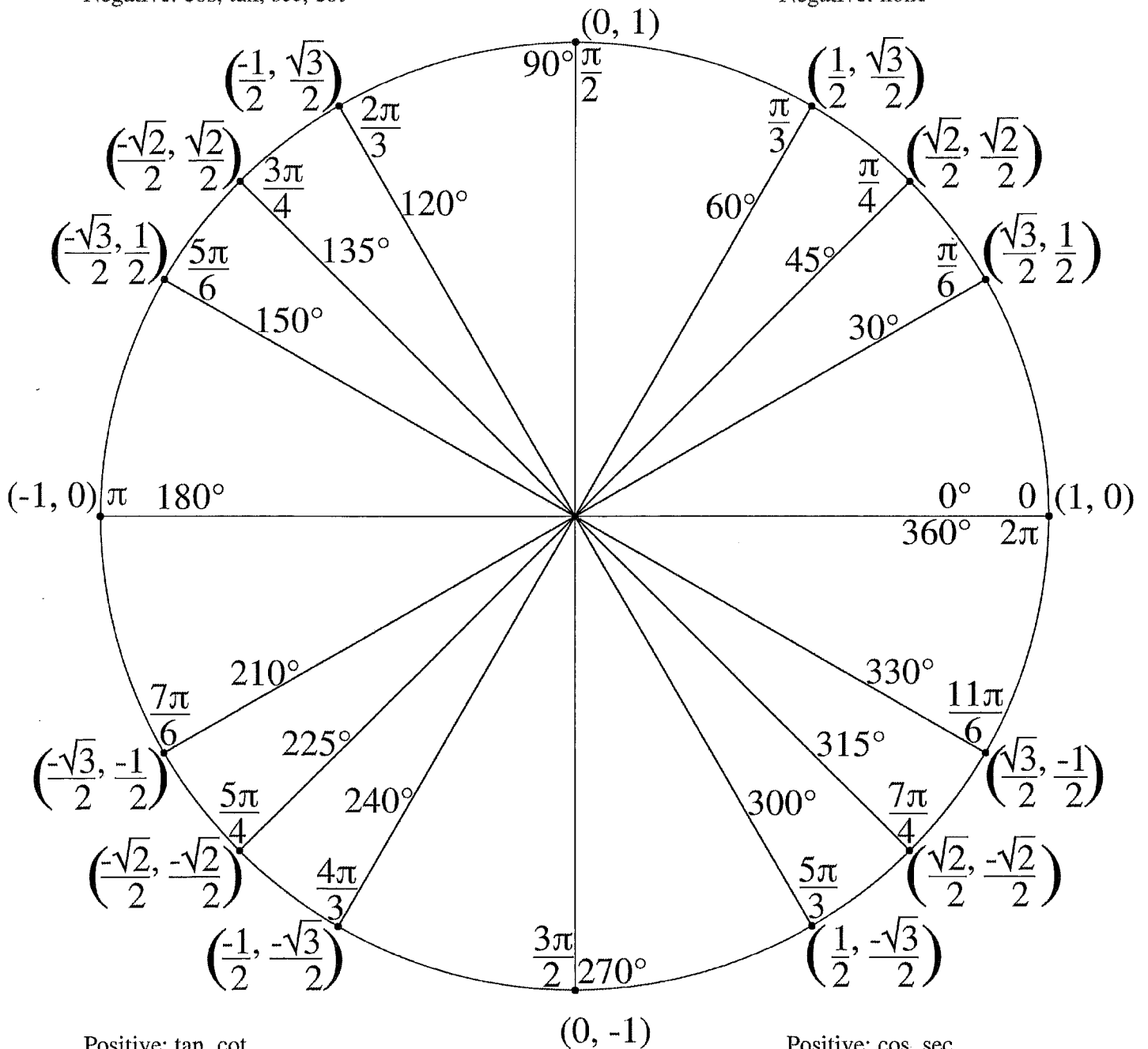


Degree	Radian	Coordinates	cos θ	sin θ	tan θ	sec θ	csc θ	cot θ
0°	0	(1, 0)	1	0	0	1	und	und
30°	$\pi/6$	($\frac{\sqrt{3}}{2}$, $\frac{1}{2}$)	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{3}}$	$\frac{2\sqrt{3}}{3}$	2	$\sqrt{3}$
45°	$\pi/4$	($\frac{\sqrt{2}}{2}$, $\frac{\sqrt{2}}{2}$)	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60°	$\pi/3$	($\frac{1}{2}$, $\frac{\sqrt{3}}{2}$)	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\sqrt{3}$	2	$\frac{2\sqrt{3}}{3}$	$\frac{1}{\sqrt{3}}$
90°	$\pi/2$	(0, 1)	0	1	und	und	1	0

The Unit Circle

Positive: sin, csc
Negative: cos, tan, sec, cot

Positive: sin, cos, tan, sec, csc, cot
Negative: none



Positive: tan, cot
Negative: sin, cos, sec, csc

Positive: cos, sec
Negative: sin, tan, csc, cot