Trigonometry Review Information
AP Calculus

Special Angle Table

Degrees	Radians	Sine	Cosine	Tangent	Cotangent	Secant	Cosecant
0°	0	0	1	0	undefined	1	undefined
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	1	$\sqrt{2}$	$\sqrt{2}$
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$
90°	$\frac{\pi}{2}$	1	0	undefined	0	undefined	1

Reciprocal & Ratio Relationships

$$\sin x = \frac{1}{\csc x} \qquad \csc x = \frac{1}{\sin x} \qquad \tan x = \frac{\sin x}{\cos x}$$

$$\cos x = \frac{1}{\sec x} \qquad \sec x = \frac{1}{\cos x} \qquad \cot x = \frac{\cos x}{\sin x}$$

$$\tan x = \frac{1}{\cot x} \qquad \cot x = \frac{1}{\tan x}$$

Pythagorean Relationships

$$\sin^2 x + \cos^2 x = 1 \qquad 1 + \tan^2 x = \sec^2 x \qquad 1 + \cot^2 x = \csc^2 x$$

Double-Angle Formulas

$$\sin 2x = 2\sin x \cos x \qquad \sin^2 x = \frac{1}{2}(1 - \cos 2x) \qquad \cos^2 x = \frac{1}{2}(1 + \cos 2x)$$

Range of Inverse Trigonometric Functions

$$R: -\frac{\pi}{2} \le y \le \frac{\pi}{2}$$
$$y = \sin^{-1} x$$
$$y = \csc^{-1} x,\ y \ne 0$$

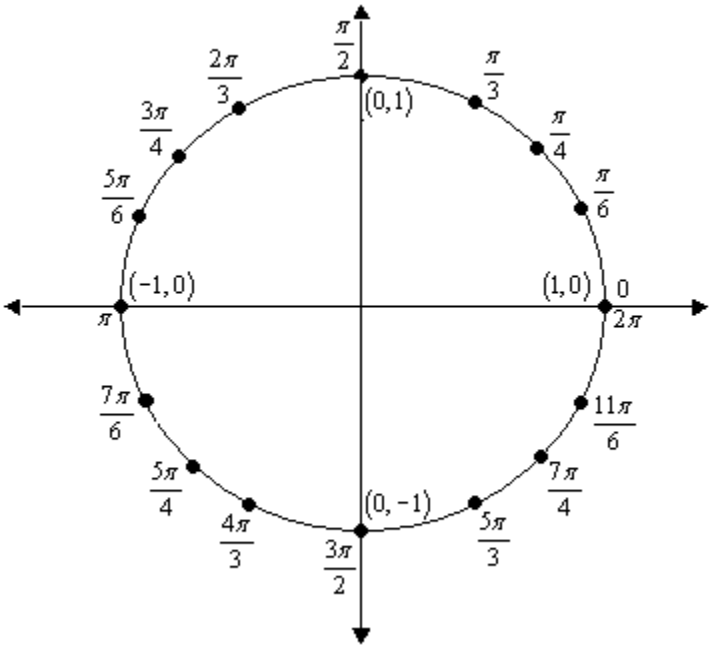
$$R: -\frac{\pi}{2} < y < \frac{\pi}{2}$$
$$y = \tan^{-1} x$$

$$R: 0 \le y \le \pi$$
$$y = \cos^{-1} x$$
$$y = \sec^{-1} x,\ y \ne \frac{\pi}{2}$$

$$R: 0 < y < \pi$$
$$y = \cot^{-1} x$$

Unit Circle

POSITIVE FUNCTIONS
Quadrant I – All
Quadrant II – Only Sine/Cosecant
Quadrant III – Only Tangent/Cotangent
Quadrant IV – Only Cosine/Secant



$$\cos\theta = \frac{x}{r}$$

$$\sin\theta = \frac{y}{r}$$

$$\tan\theta = \frac{y}{x}$$

Ordered pairs in the Unit Circle
$(\cos\theta, \sin\theta)$

Trigonometric Derivatives

$$\frac{d(\sin u)}{dx} = \cos u \frac{du}{dx}$$

$$\frac{d(\cos u)}{dx} = -\sin u \frac{du}{dx}$$

$$\frac{d(\tan u)}{dx} = \sec^2 u \frac{du}{dx}$$

$$\frac{d(\cot u)}{dx} = -\csc^2 u \frac{du}{dx}$$

$$\frac{d(\sec u)}{dx} = \sec u \tan u \frac{du}{dx}$$

$$\frac{d(\csc u)}{dx} = -\csc u \cot u \frac{du}{dx}$$

Inverse Trigonometric Derivatives

$$\frac{d(\sin^{-1} u)}{dx} = \frac{du/dx}{\sqrt{1-u^2}}$$

$$\frac{d(\cos^{-1} u)}{dx} = \frac{-du/dx}{\sqrt{1-u^2}}$$

$$\frac{d(\tan^{-1} u)}{dx} = \frac{du/dx}{1+u^2}$$

$$\frac{d(\cot^{-1} u)}{dx} = \frac{-du/dx}{1+u^2}$$

$$\frac{d(\sec^{-1} u)}{dx} = \frac{du/dx}{|u|\sqrt{u^2-1}}$$

$$\frac{d(\csc^{-1} u)}{dx} = \frac{-du/dx}{|u|\sqrt{u^2-1}}$$