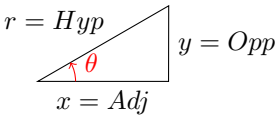
Texas A&M University

Useful Trigonometric Formulae

Radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
Degree	0°	30°	45°	60°	90°
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	DNE

Definition: Given the following right triangle



$$\cos\theta = \frac{Adj}{Hyp} \qquad \sec\theta = \frac{Hyp}{Adj} = \frac{1}{\cos\theta}$$
$$\sin\theta = \frac{Opp}{Hyp} \qquad \csc\theta = \frac{Hyp}{Opp} = \frac{1}{\sin\theta}$$
$$\tan\theta = \frac{Opp}{Adj} = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{Adj}{Opp} = \frac{\cos\theta}{\sin\theta}$$

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

$$\sin(x+y) = \sin x\cos y + \cos x\sin y \qquad \cos(x+y) = \cos x\cos y - \sin x\sin y$$
$$\sin(x-y) = \sin x\cos y - \cos x\sin y \qquad \cos(x-y) = \cos x\cos y + \sin x\sin y$$
$$\sin(2x) = 2\sin x\cos x \qquad \cos(2x) = \cos^2 x - \sin^2 x$$
$$= 2\cos^2 x - 1$$
$$= 1 - 2\sin^2 x$$

Half-angle formula:

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

$$\sin A \cos B = \frac{1}{2}\left(\sin(A-B) + \sin(A+B)\right)$$
$$\sin A \sin B = \frac{1}{2}\left(\cos(A-B) - \cos(A+B)\right)$$
$$\cos A \cos B = \frac{1}{2}\left(\cos(A-B) + \cos(A+B)\right)$$

Derivatives:

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