Trig Identities Cheat Sheet

The expression SOHCAHTOA gives the fundamental relationships of sine, cosine, and tangent to a right triangle. For secant, cosecant, and cotangent go from right to left instead of left to right. But you need to know the reciprocal identities!

PYTHAGOREAN IDENTITIES

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

RECIPROCAL IDENTITIES

$$\sec(\theta) = \frac{1}{\cos(\theta)} \qquad \csc(\theta) = \frac{1}{\sin(\theta)} \qquad \cot(\theta) = \frac{1}{\tan(\theta)} = \frac{\cos(\theta)}{\sin(\theta)}$$

SUM-DIFFERENCE RESULTS

$$\sin(A+B) = \sin(A)\cdot\cos(B) + \cos(A)\cdot\sin(B) \qquad \cos(A+B) = \cos(A)\cdot\cos(B) - \sin(A)\cdot\sin(B)$$

$$\sin(A-B) = \sin(A)\cdot\cos(B) - \cos(A)\cdot\sin(B) \qquad \cos(A-B) = \cos(A)\cdot\cos(B) + \sin(A)\cdot\sin(B)$$

DOUBLE-ANGLE IDENTITIES

$$\sin(2\theta) = 2\cdot\sin(\theta)\cdot\cos(\theta)$$

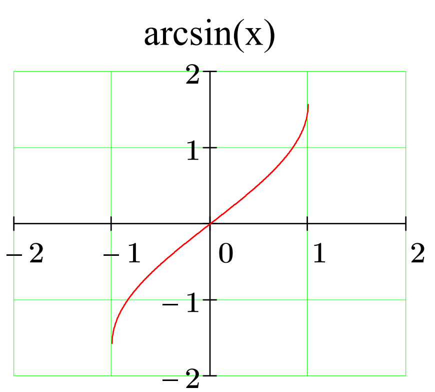
$$\begin{aligned}\cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta)\\ &= 2\cdot\cos^2(\theta) - 1\\ &= 1 - 2\cdot\sin^2(\theta)\end{aligned}$$

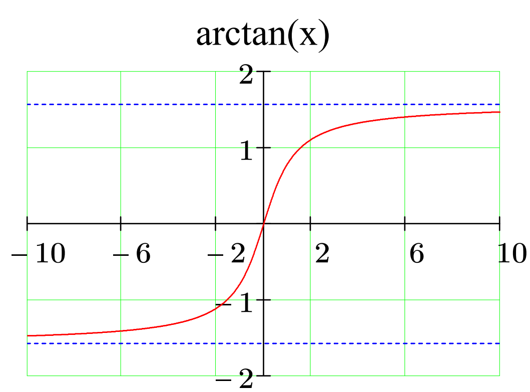
HALF-ANGLE IDENTITIES

$$\sin(\theta) = +- \sqrt{\frac{1-\cos(2\theta)}{2}}$$

$$\cos(\theta) = +- \sqrt{\frac{1+\cos(2\theta)}{2}}$$

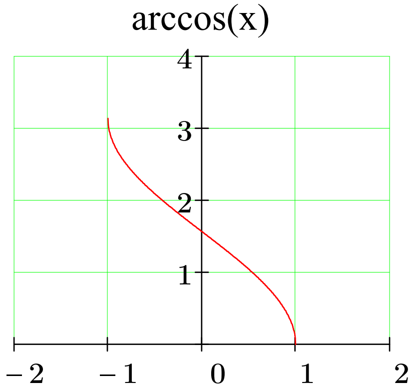
INVERSE TRIG FUNCTIONS

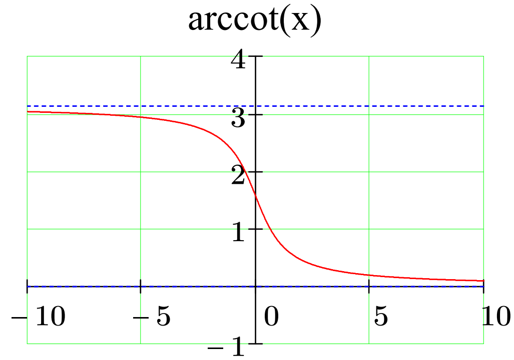




$\text{Dom} = [-1, 1] \quad \text{Range} = [\frac{-\pi}{2}, \frac{\pi}{2}]$

$\text{Dom} = (-\infty, \infty) \quad \text{Range} = \left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$





Dom = $[-1, 1]$ Range = $[0, \pi]$

Dom = $(-\infty, \infty)$ Range = $(0, \pi)$

TRIG EQUATIONS

To solve Trig equations exactly over some interval I = [a,b], find the quadrants where the sign is correct, identify a reference angle from the first quadrant, draw a picture on the unit circle using the first two steps, and get the solutions by adding or subtracting the reference angle from π or 2π. To find all the solutions, take the solutions from one cycle and add multiples of the period.

SINUSOIDAL FUNCTIONS

$y = A \cdot \sin(Bx)$ is a sine curve with amplitude $|A|$ and period $\dfrac{2\pi}{B}$. To construct the graph, draw a sine curve that completes a cycle at $\dfrac{2\pi}{B}$, then divide the interval into 4 equal parts, and label all points.

$y = A \cdot \cos(Bx)$ is a cosine curve with amplitude $|A|$ and period $\dfrac{2\pi}{B}$. To construct the graph, draw a cosine curve that completes a cycle at $\dfrac{2\pi}{B}$, then divide the interval into 4 equal parts, and label all points.