RELATION OF ANGULAR FUNCTIONS IN TERMS OF ONE ANOTHER

Trigonometric Functions

Function	sin α	cos α	tan α	cot α	sec α	csc α
$\sin\alpha$	$\sin\alpha$	$\pm\sqrt{1-\cos^2\alpha}$	$\frac{\tan\alpha}{\pm\sqrt{1+\tan^2\alpha}}$	$\frac{1}{\pm\sqrt{1+\cot^2\alpha}}$	$\frac{\pm\sqrt{\sec^2\alpha-1}}{\sec\alpha}$	$\frac{1}{\csc\alpha}$
$\cos\alpha$	$\pm\sqrt{1-\sin^2\alpha}$	$\cos\alpha$	$\frac{1}{\pm\sqrt{1+\tan^2\alpha}}$	$\frac{\cot\alpha}{\pm\sqrt{1+\cot^2\alpha}}$	$\frac{1}{\sec\alpha}$	$\frac{\pm\sqrt{\csc^2\alpha-1}}{\csc\alpha}$
$\tan\alpha$	$\frac{\sin\alpha}{\pm\sqrt{1-\sin^2\alpha}}$	$\frac{\pm\sqrt{1-\cos^2\alpha}}{\cos\alpha}$	$\tan\alpha$	$\frac{1}{\cot\alpha}$	$\pm\sqrt{\sec^2\alpha-1}$	$\frac{1}{\pm\sqrt{\csc^2\alpha-1}}$
$\cot\alpha$	$\frac{\pm\sqrt{1-\sin^2\alpha}}{\sin\alpha}$	$\frac{\cos\alpha}{\pm\sqrt{1-\cos^2\alpha}}$	$\frac{1}{\tan\alpha}$	$\cot\alpha$	$\frac{1}{\pm\sqrt{\sec^2\alpha-1}}$	$\pm\sqrt{\csc^2\alpha-1}$
$\sec\alpha$	$\frac{1}{\pm\sqrt{1-\sin^2\alpha}}$	$\frac{1}{\cos\alpha}$	$\pm\sqrt{1+\tan^2\alpha}$	$\frac{\pm\sqrt{1+\cot^2\alpha}}{\cot\alpha}$	$\sec\alpha$	$\frac{\csc\alpha}{\pm\sqrt{\csc^2\alpha-1}}$
$\csc\alpha$	$\frac{1}{\sin\alpha}$	$\frac{1}{\pm\sqrt{1-\cos^2\alpha}}$	$\frac{\pm\sqrt{1+\tan^2\alpha}}{\tan\alpha}$	$\pm\sqrt{1+\cot^2\alpha}$	$\frac{\sec\alpha}{\pm\sqrt{\sec^2\alpha-1}}$	$\csc\alpha$

Note: The choice of sign depends upon the quadrant in which the angle terminates.

Hyperbolic Functions

Function	sinh x	cosh x	tanh x
$\sinh x =$	$\sinh x$	$+\sqrt{\cosh^2 x-1}$	$\frac{\tanh x}{\sqrt{1-\tanh^2 x}}$
$\cosh x =$	$\sqrt{1+\sinh^2 x}$	$\cosh x$	$\frac{1}{\sqrt{1-\tanh^2 x}}$
$\tanh x =$	$\frac{\sinh x}{\sqrt{1+\sinh^2 x}}$	$\pm\frac{\sqrt{\cosh^2 x-1}}{\cosh x}$	$\tanh x$
$\text{cosech}\, x =$	$\frac{1}{\sinh x}$	$\pm\frac{1}{\sqrt{\cosh^2 x-1}}$	$\frac{\sqrt{1-\tanh^2 x}}{\tanh x}$
$\text{sech}\, x =$	$\frac{1}{\sqrt{1+\sinh^2 x}}$	$\frac{1}{\cosh x}$	$\sqrt{1-\tanh^2 x}$
$\coth x =$	$\frac{\sqrt{1+\sinh^2 x}}{\sinh x}$	$\frac{\pm\cosh x}{\sqrt{\cosh^2 x-1}}$	$\frac{1}{\tanh x}$

Function	cosech x	sech x	coth x
$\sinh x =$	$\frac{1}{\text{cosech}\, x}$	$\pm\frac{\sqrt{1-\text{sech}^2 x}}{\text{sech}\, x}$	$\frac{\pm 1}{\sqrt{\coth^2 x-1}}$
$\cosh x =$	$\pm\frac{\sqrt{\text{cosech}^2 x+1}}{\text{cosech}\, x}$	$\frac{1}{\text{sech}\, x}$	$\pm\frac{\coth x}{\sqrt{\coth^2 x-1}}$
$\tanh x =$	$\frac{1}{\sqrt{\text{cosech}^2 x+1}}$	$\pm\sqrt{1+\text{sech}^2 x}$	$\frac{1}{\coth x}$
$\text{cosech}\, x =$	$\text{cosech}\, x$	$\pm\frac{\text{sech}\, x}{\sqrt{1-\text{sech}^2 x}}$	$\pm\frac{\sqrt{\coth^2 x-1}}{1}$
$\text{sech}\, x =$	$\pm\frac{\text{cosech}\, x}{\sqrt{\text{cosech}^2 x+1}}$	$\text{sech}\, x$	$\pm\frac{\sqrt{\coth^2 x-1}}{\coth x}$
$\coth x =$	$\sqrt{\text{cosech}^2 x+1}$	$\pm\frac{1}{\sqrt{1-\text{sech}^2 x}}$	$\coth x$

Whenever two signs are shown, choose + sign if x is positive, − sign if x is negative.