



## Inverse Trigonometric Functions

Inverse trigonometric functions use the ratio of sides from the triangle to find an angle of the triangle. The inverse tan of 1 (or arctan 1) is:

$$\arctan 1 = \tan^{-1} 1 = 45^\circ = \frac{\pi}{4}$$

Be careful! While  $\sin^2 x$  is defined as  $(\sin x)^2$ ,  $\sin^{-1} x$  is not the same thing as  $(\sin x)^{-1} = \frac{1}{\sin x} = \csc x$ . The  $^{-1}$  in  $\sin^{-1} x$  is not an exponent (even though it looks like one). It's the symbol for an inverse function, so it is in  $f^{-1}(x)$ . Any trig symbol with a  $^{-1}$  is an inverse trig function, and it will give an angle as its final value.

FUNCTION	GRAPH	DOMAIN (x)	RANGE (y)	
arcsine $y = \arcsin x = \sin^{-1} x$		$[-1, 1]$	$[-\frac{\pi}{2}, \frac{\pi}{2}]$	
arccosine $y = \arccos x = \cos^{-1} x$		$[-1, 1]$	$[0, \pi]$	
arctangent $y = \arctan x = \tan^{-1} x$		$(-\infty, \infty)$	$(-\frac{\pi}{2}, \frac{\pi}{2})$	
arccosecant $y = \operatorname{arccsc} x = \csc^{-1} x$		$(-\infty, -1] \cup [1, \infty)$	$(-\frac{\pi}{2}, 0) \cup (0, \frac{\pi}{2}]$	
arcsecant $y = \operatorname{arcsec} x = \sec^{-1} x$		$(-\infty, -1] \cup [1, \infty)$	$[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \pi]$	
arccotangent $y = \operatorname{arccot} x = \cot^{-1} x$		$(-\infty, \infty)$	$(0, \pi)$	

To evaluate  $\sec^{-1} x$ ,  $\csc^{-1} x$ , and  $\cot^{-1} x$  on a calculator, first invert  $x$ . The easiest way to do this is to type  $[1] \div [x]$ . Then use the inverse function that is the reciprocal of the one in the question: sin for csc, cos for sec, and tan for cot.