



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.