

Trigonometric functions

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<code>asinh(x)</code>	the inverse hyperbolic sine of x
<code>atan(x)</code>	the radian value of the arctangent of x
<code>atan2(y, x)</code>	the radian value of the arctangent of y/x , where the signs of the parameters y and x are used to determine the quadrant of the answer
<code>atanh(x)</code>	the inverse hyperbolic tangent of x
<code>cos(x)</code>	the cosine of x , where x is in radians
<code>cosh(x)</code>	the hyperbolic cosine of x
<code>sin(x)</code>	the sine of x , where x is in radians
<code>sinh(x)</code>	the hyperbolic sine of x
<code>tan(x)</code>	the tangent of x , where x is in radians
<code>tanh(x)</code>	the hyperbolic tangent of x

Functions

`acos(x)`
 Description: the radian value of the arccosine of x
 Domain: -1 to 1
 Range: 0 to π

`acosh(x)`
 Description: the inverse hyperbolic cosine of x

$$\operatorname{acosh}(x) = \ln(x + \sqrt{x^2 - 1})$$
 Domain: 1 to $8.9\text{e}+307$
 Range: 0 to 709.77

`asin(x)`
 Description: the radian value of the arcsine of x
 Domain: -1 to 1
 Range: $-\pi/2$ to $\pi/2$

`asinh(x)`
 Description: the inverse hyperbolic sine of x

$$\operatorname{asinh}(x) = \ln(x + \sqrt{x^2 + 1})$$
 Domain: $-8.9\text{e}+307$ to $8.9\text{e}+307$
 Range: -709.77 to 709.77

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atan(x)

Description: the radian value of the arctangent of x

Domain: $-8e+307$ to $8e+307$

Range: $-\pi/2$ to $\pi/2$

atan2(y, x)

Description: the radian value of the arctangent of y/x , where the signs of the parameters y and x are used to determine the quadrant of the answer

Domain y : $-8e+307$ to $8e+307$

Domain x : $-8e+307$ to $8e+307$

Range: $-\pi$ to π

atanh(x)

Description: the inverse hyperbolic tangent of x

$$\operatorname{atanh}(x) = \frac{1}{2} \{ \ln(1+x) - \ln(1-x) \}$$

Domain: -1 to 1

Range: $-8e+307$ to $8e+307$

cos(x)

Description: the cosine of x , where x is in radians

Domain: $-1e+18$ to $1e+18$

Range: -1 to 1

cosh(x)

Description: the hyperbolic cosine of x

$$\operatorname{cosh}(x) = \{ \exp(x) + \exp(-x) \} / 2$$

Domain: -709 to 709

Range: 1 to $4.11e+307$

sin(x)

Description: the sine of x , where x is in radians

Domain: $-1e+18$ to $1e+18$

Range: -1 to 1

sinh(x)

Description: the hyperbolic sine of x

$$\operatorname{sinh}(x) = \{ \exp(x) - \exp(-x) \} / 2$$

Domain: -709 to 709

Range: $-4.11e+307$ to $4.11e+307$

tan(x)

Description: the tangent of x , where x is in radians

Domain: $-1e+18$ to $1e+18$

Range: $-1e+17$ to $1e+17$ or *missing*

tanh(x)

Description: the hyperbolic tangent of x

$$\operatorname{tanh}(x) = \{ \exp(x) - \exp(-x) \} / \{ \exp(x) + \exp(-x) \}$$

Domain: $-8e+307$ to $8e+307$

Range: -1 to 1 or *missing*

□ Technical note

The trigonometric functions are defined in terms of *radians*. There are 2π radians in a circle. If you prefer to think in terms of *degrees*, because there are also 360 degrees in a circle, you may convert degrees into radians by using the formula $r = d\pi/180$, where d represents degrees and r represents radians. Stata includes the built-in constant `_pi`, equal to π to machine precision. Thus, to calculate the sine of `theta`, where `theta` is measured in degrees, you could type

```
sin(theta*_pi/180)
```

`atan()` similarly returns radians, not degrees. The arccotangent can be obtained as

```
acot(x) = _pi/2 - atan(x)
```

□

References

Norton, E. C. 2022. [The inverse hyperbolic sine transformation and retransformed marginal effects](#). *Stata Journal* 22: 702–712.

Oldham, K. B., J. C. Myland, and J. Spanier. 2009. *An Atlas of Functions*. 2nd ed. New York: Springer.

Also see

[FN] [Functions by category](#)

[D] [egen](#) — Extensions to generate

[D] [generate](#) — Create or change contents of variable

[M-5] [sin\(\)](#) — Trigonometric and hyperbolic functions

[U] [13.3 Functions](#)

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