

factorial() — Factorial and gamma function
[Description](#)[Syntax](#)[Conformability](#)[Diagnostics](#)[Also see](#)

Description

`factorial(R)` returns the elementwise factorial of *R*.

`lnfactorial(R)` returns the elementwise $\ln(\text{factorial}(R))$, calculated differently. Very large values of *R* may be evaluated.

`lngamma(Z)`, for *Z* real, returns the elementwise real result $\ln(\text{abs}(\text{gamma}(Z)))$, but calculated differently. `lngamma(Z)`, for *Z* complex, returns the elementwise $\ln(\text{gamma}(Z))$, calculated differently. Thus, `lngamma(-2.5) = -0.056244`, whereas `lngamma(-2.5+0i) = -0.056244 + 3.1416i`. In both cases, very large values of *Z* may be evaluated.

`gamma(Z)` returns $\exp(\text{lngamma}(Z))$ for complex arguments and $\text{Re}(\exp(\text{lngamma}(C(Z))))$ for real arguments. Thus `gamma()` can correctly calculate, say, `gamma(-2.5)` even for real arguments.

`digamma(R)` returns the derivative of `lngamma()` for $R > 0$, sometimes called the psi function. `digamma()` requires a real argument.

`trigamma(R)` returns the second derivative of `lngamma()` for $R > 0$. `trigamma()` requires a real argument.

Syntax

real matrix `factorial(real matrix R)`

real matrix `lnfactorial(real matrix R)`

numeric matrix `lngamma(numeric matrix Z)`

numeric matrix `gamma(numeric matrix Z)`

real matrix `digamma(real matrix R)`

real matrix `trigamma(real matrix R)`

Conformability

All functions return a matrix of the same dimension as input, containing element-by-element calculated results.

Diagnostics

`factorial()` returns missing for noninteger arguments, negative arguments, and arguments > 167 .

`lnfactorial()` returns missing for noninteger arguments, negative arguments, and arguments $> 1e+305$.

`lngamma()` returns missing for 0, negative integer arguments, negative arguments $\leq -2,147,483,648$, and arguments $> 1e+305$.

`gamma()` returns missing for real arguments > 171 and for negative integer arguments.

`digamma()` returns missing for 0 and negative integer arguments and for arguments $< -10,000,000$.

`trigamma()` returns missing for 0 and negative integer arguments and for arguments $< -10,000,000$.

Also see

[M-4] **Scalar** — Scalar mathematical functions

[M-4] **Statistical** — Statistical functions

Stata, Stata Press, and Mata are registered trademarks of StataCorp LLC. Stata and Stata Press are registered trademarks with the World Intellectual Property Organization of the United Nations. StataNow and NetCourseNow are trademarks of StataCorp LLC. Other brand and product names are registered trademarks or trademarks of their respective companies. Copyright © 1985–2023 StataCorp LLC, College Station, TX, USA. All rights reserved.



For suggested citations, see the FAQ on [citing Stata documentation](#).