

C() — Make complex

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Description

$C(A)$ returns A converted to complex. $C(A)$ returns A if A is already complex. If A is real, $C(A)$ returns $A+0i$ — A cast up to complex. Coding $C(A)$ is thus how you ensure that the matrix is treated as complex.

$C(R, I)$ returns the complex matrix $R+Ii$ and is faster than the alternative $R + I:*1i$.

Syntax

complex matrix $C(\text{numeric matrix } A)$

complex matrix $C(\text{real matrix } R, \text{ real matrix } I)$

Remarks and examples

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Many of Mata's functions are overloaded, meaning they return a real when given real arguments and a complex when given complex arguments. Given real arguments, if the result cannot be expressed as a real, missing value is returned. Thus `sqrt(-1)` evaluates to missing, whereas `sqrt(-1+0i)` is `1i`.

$C()$ is the fast way to make arguments that might be real into complex. You can code

```
result = sqrt(C(x))
```

If x already is complex, $C()$ does nothing; if x is real, $C(x)$ returns the complex equivalent.

The two-argument version of $C()$ is less frequently used. $C(R, I)$ is literally equivalent to $R :+ I*1i$, meaning that R and I need only be c-conformable.

For instance, $C(1, (1,2,3))$ evaluates to $(1+1i, 1+2i, 1+3i)$.

Conformability

$C(A)$:

A: $r \times c$
result: $r \times c$

$C(R, I)$:

R: $r_1 \times c_1$
I: $r_2 \times c_2$, R and I c-conformable
result: $\max(r_1, r_2) \times \max(c_1, c_2)$

Diagnostics

`C(Z)`, if Z is complex, literally returns Z and not a copy of Z . This makes execution of `C()` applied to complex arguments instant.

In `C(R, I)`, the i, j element of the result will be missing anywhere $R[i, j]$ or $I[i, j]$ is missing. For instance, `C((1, 3, .), (. , 2, 4))` results in `(. , 3+2i, .)`. If $R[i, j]$ and $I[i, j]$ are both missing, then the $R[i, j]$ value will be used; for example, `C(. a, . b)` results in `. a`.

Also see

[M-5] **Re()** — Extract real or imaginary part

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

[M-4] **Utility** — Matrix utility functions