Title

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op_kronecker — Kronecker direct-product operator

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Description

A#*B* returns the Kronecker direct product.

binds tightly: *X*∗*A*#*B*∗*Y* is interpreted as *X*∗(*A*#*B*)∗*Y*.

Syntax

A#*B*

where *A* and *B* may be real or complex.

Remarks and examples

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The Kronecker direct product is also known as the Kronecker product, the direct product, the tensor product, and the outer product.

The Kronecker product *A*#*B* is the matrix $||a_{ij}*B||$.

Conformability

A#*B*:

A:	$r_1 \times c_1$
B:	$r_2 \times c_2$
result:	$r_1*r_2 \times c_1*c_2$

Diagnostics

None.

Leopold Kronecker (1823–1891) was born in Liegnitz, Prussia (now Legnica, Poland), to a well-off family. He attended the universities of Berlin, Bonn, and Breslau before completing a doctorate on the complex roots of unity. For several years, Kronecker devoted himself to business interests while working on mathematics in his spare time, publishing particularly in number theory, elliptic functions, and the theory of equations. He later started giving lectures at the university in Berlin, as was his right as a member of the Academy of Science. In 1883, he was appointed as the chair. Kronecker came to believe that mathematical arguments should involve only finite numbers and a finite number of operations, which led to increasing mathematical and personal disagreements with those who worked on irrational numbers or nonconstructive existence proofs.

Reference

James, I. M. 2002. *Remarkable Mathematicians: From Euler to von Neumann*. Cambridge: Cambridge University Press.

Also see

[M-2] **exp** — Expressions

[M-2] **intro** — Language definition