Kronecker Delta Encyclopedia Article

Kronecker Delta

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Kronecker Delta

A Kronecker delta is a compact notation that indicates the equivalent of a dot product in vector notations. In this usage, it takes the form of a Greek letter delta with two subscripts which indicate that the components are to be multiplied if the subscripts are equal and thrown out if the subscripts are different. That is, the Kronecker delta notation indicates that the x-components should be multiplied together, the y-components should be multiplied together, and the product of x- and y-components should be ignored.

The Kronecker delta is not only used in vector **equations**, however. It can be used with a set of subscripted **functions** to indicate the orthogonality of that set. If an arbitrary set K_n of functions is orthogonal, then the integral of the product of those functions K_m and K_l with their appropriate weighting function will equal the Kronecker delta with respect to l and m: 1 if l = m and 0 if l and m are not equal. This flexible notation can also be used to mean that only those functions which "match" or have the same subscripts should be considered in product, or that only repeated subscripts should be considered. It can indicate that, even if the products would otherwise not be **zero**, there are considerations that leave them out of the problem at hand. The Kronecker delta is not something that can be proven or disproven--it merely indicates, without a lot of excess verbiage, which of several potential components the mathematician is using.