

## $\epsilon_{ijk}$ tensor

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The  $\epsilon_{ijk}$  tensor is defined by the following. The value is 0 if any of the indices are equal, i.e. if  $i = j$ ,  $i = k$ , or  $j = k$ . Given that the above conditions do not hold, then  $\{i, j, k\} = \{1, 2, 3\}$  as sets. That is,  $(i, j, k)$  is a permutation of  $(1, 2, 3)$ . In this case, the value is the sign of that permutation.

The  $\epsilon_{ijk}$  tensor satisfies the following three contraction identities.

$$\epsilon_{ija}\epsilon_{kla} = \delta_{ik}\delta_{jl} - \delta_{il}\delta_{jk}$$

$$\epsilon_{iab}\epsilon_{jab} = 2\delta_{ij}$$

$$\epsilon_{abc}\epsilon_{abc} = 6$$