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### 0.1 Transposition and conjugation

#### 0.1.1 Transposition

A matrix of dimensions  $m * n$  can be transformed into a matrix  $n * m$  by transposition.

$$B = A^T$$

$$b_{ij} = a_{ji}$$

#### 0.1.2 Transpose rules

$$(M^T)^T = M$$

$$(AB)^T = B^T A^T$$

$$(A + B)^T = A^T + B^T$$

$$(zM)^T = zM^T$$

#### 0.1.3 Conjugation

With conjugation we take the complex conjugate of each element.

$$B = \overline{A}$$

$$b_{ij} = \overline{a_{ij}}$$

#### 0.1.4 Conjugation rules

$$\overline{(\overline{A})} = A$$

$$\overline{(AB)} = (\overline{A})(\overline{B})$$

$$\overline{(A + B)} = \overline{A} + \overline{B}$$

$$\overline{(zM)} = \overline{z}\overline{M}$$

### 0.1.5 Conjugate transposition

Like transposition, but with conjugate.

$$B = A^*$$

$$b_{ij} = a_{ji}^*$$

Alternatively, and particularly in physics, the following symbol is often used instead.

$$(A^*)^T = A^\dagger$$