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0.1 Traces

The trace of a matrix is the sum of its diagonal components.

$Tr(M) = \sum_i^n m_{ii}$

The trace of a matrix is equal to the sum of its eigenvectors.

0.2 Properties of traces

Traces commute

$Tr(AB) = Tr(BA)$

Traces of 1×1 matrices are equal to their component.

$Tr(M) = m_{11}$

0.3 Trace trick

If we want to manipulate the scalar:

$v^T Mv$

We can use properties of the trace.

$v^T Mv = Tr(v^T Mv)$

$v^T Mv = Tr([v^T][Mv])$

$v^T Mv = Tr([Mv][v^T])$

$v^T Mv = Tr(Mvv^T)$