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0.1 Positive-definite matrices

The matrix M is positive definite if for all non-zero vectors the scalar is positive.

$v^T M v$

We know that the outcome is a scalar, so:

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

$v^T M v = v^T M^T v$

$v^T (M - M^T) v = 0$