

Antisymmetric Tensor and Determinant:

For a general  $N \times N$  matrix  $M$ ,

$$\epsilon_{i_1 i_2 \dots i_N} M^{i_1}_{j_1} M^{i_2}_{j_2} \dots M^{i_N}_{j_N} = (\det[M]) \epsilon_{j_1 j_2 \dots j_N}$$