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0.1 Special orthogonal groups $SO(n, F)$

The special orthogonal group, $SO(n, F)$, is the subgroup of the orthogonal group where $|M| = 1$.

As a result it includes only the rotation operators, not the flip operators.

$SO(3)$ is rotations in 3d space.

$SO(2)$ is rotations in 2d space.

0.1.1 Determinant of the orthogonal group

The orthogonal group has determinants of -1 or 1.

$O^T = O^{-1}$

$\det(O^T) = \det(O^{-1})$

$$\det O = \frac{1}{\det O}$$

$\det O = \pm 1$