0.1 Orthogonal groups $O(n, F)$

0.1.1 Recap: Metric-preserving transformations

The bilinear form is:

$u^T M v$

The transformations which preserve this are:

$P^T M P = M$

0.1.2 The orthogonal group

If the metic is $M = I$ then the condition is:

$P^T P = I$

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

These form the orthogonal group.

We use O instead of P:

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

0.1.3 Rotations and reflections

The orthogonal group is the rotations and reflections.

0.1.4 Parameters of the orthogonal group

The orthogonal group depends on the dimension of the vector space, and the underlying field. So we can have:

- $O(n, R)$; and
- $O(n, C)$.

0.1.5 We generally refer only to the reals

$O(n)$ means $O(n, R)$.

The generally refer to the reals only.