

Distribution theory for the OLS t-statistic

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Chapter 1

Placeholder

Theorem 1 (Orthogonal matrices preserve squared Euclidean norm). *Let n be a finite type and let $Q \in \mathrm{O}(n)$ be an orthogonal real matrix. Then for every vector $x \in \mathbb{R}^n$,*

$$(Qx) \cdot (Qx) = x \cdot x.$$

Proof. From $Q^\top Q = I$ one rewrites $(Qx) \cdot (Qx) = x \cdot (Q^\top Qx) = x \cdot x$. □