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Compact subgroups of $GL(n)(\mathbb{R})$
every maximal compact subgroup of $GL(n)(\mathbb{R})$ is conjugate to $O(n)(\mathbb{R})$
compact subgroups of $GL(n)(\mathbb{R})$ are Zariski closed

Let $G \leq GL(n, \mathbb{R})$ be a compact subgroup. We know

$$G \curvearrowright \text{Mat}(n)(\mathbb{R})$$

and

$$G \{I\} = G$$

Thus by

Proposition: Let G be a compact group and $\theta : G \curvearrowright \mathbb{R}^m$ be a smooth action for some $m \geq 1$ such that G acts by polynomial automorphisms

$$\theta : G \rightarrow \text{AutPoly}(\mathbb{R}^n)$$

Then every orbit

$$G \{p\}$$

(for any $p \in \mathbb{R}^n$) is a Zariski closed subset of $\mathbb{R}^n$.

G is Zariski closed in $\text{Mat}(n)(\mathbb{R})$, thus also Zariski closed in $GL(n)(\mathbb{R})$.

Current note has 0 direct children and 0 total descendants.

- [stem](#)
 - $GL(n)(\mathbb{R})$
 - [Compact subgroups of \$GL\(n\)\(\mathbb{R}\)\$](#)

And it has 4 siblings.

- [stem](#)
 - $GL(n)(\mathbb{R})$
 - [T-closed, closed subgroups of \$GL\(n, \mathbb{R}\)\$](#)
 - [Subgroups of \$GL\(n, \mathbb{R}\)\$](#)
 - [Compact subgroups of \$GL\(n\)\(\mathbb{R}\)\$](#)
 - [T-closed, exp-closed closed subgroups of \$GL\(n, \mathbb{R}\)\$ \$\leftrightarrow\$ completely geodesic submanifolds of \$\text{Pd}\(n, \mathbb{R}\)\$](#)