Group Theory

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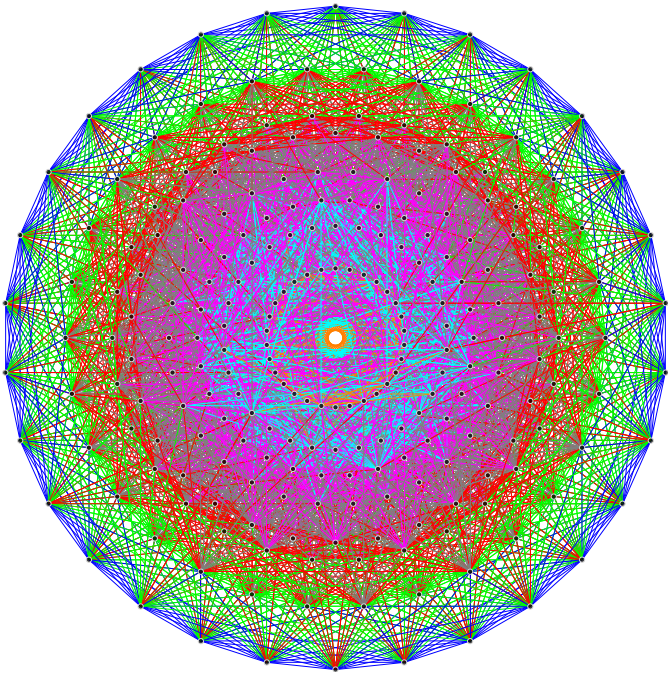

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Preface

Mainly refer to[1].

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Chapter 1

Lie Group

Definition 0.1 (Lie group)**.** Let G be a smooth manifold and also a group. If the group multiplication $\cdot\colon G^2 \to G; g, f \mapsto gf$ and the inversion $G \to G; g \mapsto g^{-1}$ are both smooth, then we call G a ***Lie group***.

Definition 0.2 (Lie algebra)**.** Let G be a Lie group, $e \in G$ be the identity of G. The ***Lie algebra*** $\mathfrak{g} = T_eG$ of Lie group G is the tangent space of G at e, equipped with a bracket operation $[,]\colon \mathfrak{g}^2 \to \mathfrak{g}$ s.t.

$$[v, w] = [V, W]|_e,$$

where V, W are two left-invariant vector fields that $V_e = v$ and $W_e = w$.

Appendix A

Appendix

Bibliography

[1] Brian C. Hall. “Lie Groups, Lie Algebras, and Representations”. In: *Quantum Theory for Mathematicians*. Ed. by Brian C. Hall. Graduate Texts in Mathematics. New York, NY: Springer, 2013, pp. 333–366. ISBN: 978-1-4614-7116-5. DOI: 10.1007/978-1-4614-7116-5_16. URL: https://doi.org/10.1007/978-1-4614-7116-5_16 (visited on 03/11/2022).

Symbol List

Here listed the important symbols used in this notes.

$\mathfrak{g}$, 1

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