

Gauge theories and Physics

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Contents

1	Review on Manifolds	2
1.1	Definition of the manifold and differentiation	2
1.2	Exercises	2
2	Lie groups	3

1 Review on Manifolds

In this first section, we will briefly review the basics of manifolds. The following is definitely fundamental, I think. In this document, I will mainly focus on differential geometry, but the facts in this section will be applied to the study of topological aspects of manifolds. We should note that the following are important points.

1.1 Definition of the manifold and differentiation

1.2 Exercises

2 Lie groups

References

- [BT82] R. Bott and L. W. Tu, *Differential Forms in Algebraic Topology*, Graduate Texts in Mathematics, vol. 82, Springer New York, New York, NY, 1982. <http://link.springer.com/10.1007/978-1-4757-3951-0>.
- [Ham17] M. J. Hamilton, *Mathematical Gauge Theory*, Universitext, Springer International Publishing, Cham, 2017. <http://link.springer.com/10.1007/978-3-319-68439-0>.
- [Nak03] M. Nakahara, *Geometry, topology, and physics*, 2nd ed., Graduate Student Series in Physics, Institute of Physics Publishing, Bristol ; Philadelphia, 2003.