

Solutions to Jean-Pierre Serre's
Lie Algebras and Lie Groups

Patrick Borse

ABSTRACT. This document contains solutions to the exercises of Jean-Pierre Serre's *Lie Algebras and Lie Groups*.

Contents

Part I. Lie Algebras	4
Chapter 2. Filtered Groups and Lie Algebras	5
Chapter 3. Universal Algebra of a Lie Algebra	6
Chapter 4. Free Lie Algebras	7
Chapter 5. Nilpotent and Solvable Lie Algebras	8
Chapter 6. Semisimple Lie Algebras	9
Chapter 7. Representations of \mathfrak{sl}_n	10
Part II. Lie Groups	11
Chapter 3. Analytic Manifolds	12
Chapter 4. Analytic Groups	13
Chapter 5. Lie Theory	14

Part I

Lie Algebras

CHAPTER 2

Filtered Groups and Lie Algebras

I.2.1.

I.2.2.

CHAPTER 3

Universal Algebra of a Lie Algebra

I.3.1.

I.3.2.

CHAPTER 4

Free Lie Algebras

I.4.1.

I.4.2.

I.4.3.

I.4.4.

I.4.5.

CHAPTER 5

Nilpotent and Solvable Lie Algebras

I.5.1.

I.5.2.

I.5.3.

CHAPTER 6

Semisimple Lie Algebras

I.6.1.

I.6.2.

I.6.3.

I.6.4.

I.6.5.

I.6.6.

I.6.7.

I.6.8.

CHAPTER 7

Representations of \mathfrak{sl}_n

I.7.1.

I.7.2.

I.7.3.

I.7.4.

I.7.5.

I.7.6.

I.7.7.

Part II

Lie Groups

CHAPTER 3

Analytic Manifolds

II.3.1.

II.3.2.

II.3.3.

II.3.4.

II.3.5.

II.3.6.

CHAPTER 4

Analytic Groups

II.4.1.

II.4.2.

II.4.3.

II.4.4.

II.4.5.

II.4.6.

II.4.7.

CHAPTER 5

Lie Theory

II.5.1.

II.5.2.

II.5.3.

II.5.4.

II.5.5.

II.5.6.