CAMBRIDGE

Cambridge University Press
978-1-316-61410-5 — An Introduction to Lie Groups and Lie Algebras
Alexander Kirillov, Jr
Index
More Information

Index

action
  of a Lie group on a manifold 11
  left 14
  right 14
  adjoint 14, 54
  coadjoint 55
Ado theorem 42

Bruhat order 177
Borel subalgebra 168
Bernstein–Gelfand–Gelfand (BGG)
    resolution 176

Campbell–Hausdorff formula 39
Cartan's criterion
  of solvability 102
  of semisimplicity 102
Cartan subalgebra 119
Cartan matrix 151
Casimir operator 112
character 67, 165
Clebsh–Gordan condition 195
commutant 91
commutator 29
  of vector fields 34
complexification 45
coroot 133
  lattice 140
coset space 8
Coxeter relations 161
Coxeter number 194
  dual 195

derivations
  of an associative algebra 37
  of a Lie algebra 38
  inner 49
distribution 43
Dynkin diagram 151
  simply-laced 154

Engel's theorem 96
exponential map
  for matrix algebras 17
  for arbitrary Lie algebra 26

flag manifold 13
Frobenius integrability criterion 43

Haar measure 64
Harish–Chandra isomorphism 190
Heisenberg algebra 50
height 139
highest weight 72, 167
highest weight vector 72, 167
highest weight representation 167
homogeneous space 13

ideal (in a Lie algebra) 32
integrable representation 192
intertwining operator 52
invariant bilinear form 56

Jacobi identity 31

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-316-61410-5 — An Introduction to Lie Groups and Lie Algebras
Alexander Kirillov, Jr
Index
More Information

Killing form 101
Kostant partition function 178

Laplace operator 49
Levi decomposition 98
length of an element of Weyl group 148
Lie group 5
Lie subgroup 10
  closed 7
Lie algebra 31
  of a Lie group 32
  abelian 31
  solvable 92
  nilpotent 92
  semisimple 96
  simple 97
  reductive 99
Lie's theorem (about representations of a solvable algebra) 94
longest element of the Weyl group 149

maximal root 174
multiplicity 57, 182

one-parameter subgroup 25
orbit 12
orthogonality relations
  for matrix elements 66
  for characters 67

Peter–Weyl theorem 69
Poincaré–Birkhoff–Witt (PBW) theorem 88
polarization of a root system 138

radical 97
rank 120, 132
real form
  of a Lie algebra 45
  of a Lie group 45
reduced expression in Weyl group 148
regular elements of $\mathfrak{h}^*$ 138
representation 11, 52
  adjoint 54
  coadjoint 55
  irreducible 57
  completely reducible 57
  unitary 61
root decomposition 120
root lattice 140
root system
  of a semisimple Lie algebra 120
  abstract 132
  reduced 132
  dual 160
  irreducible 150
roots
  positive, negative 138
  simple 138
  short, long 154

Schur Lemma 59
semisimple
  Lie algebra 96
  operator 104
  element in a Lie algebra 116
Serre relations 155
simple reflection 146
simply-laced (root system, Dynkin diagram) 154
singular vector 174
stabilizer 12, 36
subalgebra (in a Lie algebra) 32
subgroup
  closed Lie 7
  Lie 10
submanifold 4
  embedded 4
  immersed 4
subrepresentation 54
spin 83

toral subalgebra 118

unitary representation 61
universal enveloping algebra 84

Verma module 168

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-316-61410-5 — An Introduction to Lie Groups and Lie Algebras
Alexander Kirillov, Jr
Index
More Information

wall (of a Weyl chamber) 144
weight 71, 163
  integer 141
  dominant 172
weight decomposition 71, 163
weight lattice 141
Weyl chamber 143
  positive 144
  adjacent 145
Weyl character formula 178
Weyl denominator 179
Weyl group 134

Young diagram 184

© in this web service Cambridge University Press www.cambridge.org