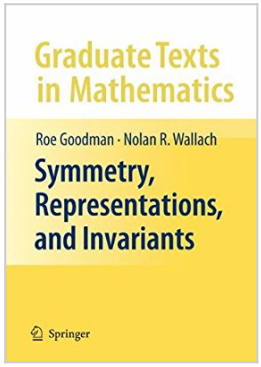

Symmetry, Representations, and Invariants (Graduate Texts in Mathematics)

By Roe Goodman, Nolan R. Wallach

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Symmetry is a key ingredient in many mathematical, physical, and biological theories. Using representation theory and invariant theory to analyze the symmetries that arise from group actions, and with strong emphasis on the geometry and basic theory of Lie groups and Lie algebras, *Symmetry, Representations, and Invariants* is a significant reworking of an earlier highly-acclaimed work by the authors. The result is a comprehensive introduction to Lie theory, representation theory, invariant theory, and algebraic groups, in a new presentation that is more accessible to students and includes a broader range of applications.

The philosophy of the earlier book is retained, i.e., presenting the principal theorems of representation theory for the classical matrix groups as motivation for the general theory of reductive groups. The wealth of examples and discussion prepares the reader for the complete arguments now given in the general case.

Key Features of *Symmetry, Representations, and Invariants*: (1) Early chapters suitable for honors undergraduate or beginning graduate courses, requiring only linear algebra, basic abstract algebra, and advanced calculus; (2) Applications to geometry (curvature tensors), topology (Jones polynomial via symmetry), and combinatorics (symmetric group and Young tableaux); (3) Self-contained chapters, appendices, comprehensive bibliography; (4) More than 350 exercises (most with detailed hints for solutions) further explore main concepts; (5) Serves as an excellent main text for a one-year course in Lie group theory; (6) Benefits physicists as well as mathematicians as a reference work.

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Editorial Review

Review

From the reviews:

"This is a terrific book, succeeding in its considerable ambitions, and doing so in the remarkable style … . Symmetry, Representations, and Invariants is indeed capable of instructing the reader in the three themes given in its title, taking him from elementary and foundational notions to very advanced material … . Symmetry, Representations, and Invariants promises to be a graduate text of major importance." (Michael Berg, The Mathematical Association of America, August, 2009)

“The book under review is a comprehensive introduction to Lie theory, representation theory, invariant theory, and algebraic groups. … can be used as a source for various kinds of courses. … supported by the rich collections of exercises (mostly with detailed hints for solutions) accompanying each section. Local reading is well supported by the structure of the book. The book can be recommended for a … wide audience of readers: for graduate and postgraduate students as well as for researchers as a reference work.” (Sergei Platonov, Zentralblatt MATH, Vol. 1173, 2009)

“The book under review is a substantial rewriting and extension of the authors’ previous work ‘Representations and Invariants of the Classical Groups’. It is a thorough and comprehensive treatment of the geometry of Lie and algebraic group actions. … More than 350 exercises are presented. This monograph is written with great care and provides an excellent basis for a variety of courses from this field.” (M. Kunzinger, Monatshefte für Mathematik, Vol. 163 (1), May, 2011)

“The book will serve as a useful reference for a broad range of mathematicians, as well as physicists seeking a rigorous, systematic development of the representation theory underlying much of modern quantum mechanics. Detailed and careful statements of definitions, theorems, and proofs are provided, as well as over 350 exercises, many of them substantial. … can be used as the basis for graduate-level courses in Lie groups and algebraic groups, representation theory, invariant theory, and a variety of applications.” (Peter J. Olver, SIAM Review, Vol. 53 (3), 2011)

“This volume is clearly a labour of love on the part of the authors, who have obviously thought very carefully about the best way to explain and motivate this often sophisticated material. … The authors have taken great pains to make this book a textbook as well as a useful reference. … It should be in the library of every university with a graduate mathematics program, as well as on the shelf of every lecturer teaching, or with research interests in, the material covered here.” (Mark Hunacek, The Mathematical Gazette, Vol. 96 (536), July, 2012)

From the Back Cover

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About the Author

Dr. Roe Goodman has been a professor for 45 years, and is currently a professor at Rutgers University. He as travelled internationally as a visiting professor to numerous prestigious universities. He has authored two books, and co-authored the previous highly successful version of this book. He has edited two books, and has published over 30 articles in refereed journals.

Dr. Nolan R. Wallach has been a professor since 1966, and is currently a professor at the University of California, San Diego. He has authored or co-authored over 100 publications. In 1992, he was the Chair of the Editorial Boards Committee of the American Mathematical Society. He has been an editor of Birkhäuser's series, *Mathematics: Theory and Applications*, since 2001. In addition to numerous other prizes, recognitions and professional organization affiliations, in 2004 he became and Elected Fellow of the American Academy of Arts and Sciences.

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