The book is clearly a reference book. It is shorter than what one might expect for a book with a title *Handbook of integration*, but I suspect that most integration problems in applied mathematics would have at least the beginning of a solution outlined in this book. People who have a variety of applied integration problems should find this book to be a valuable reference that is easy to use. I would like to have seen more information about integrals that arise in statistics. There is a brief mention of the one-dimensional normal distribution function but little else. Other readers might also find some of their favorite topics missing, but they are also likely to find plenty of new material and references. There is no other book that provides such a broad and up-to-date survey of integration methods.

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Real reductive groups II, by Nolan R. Wallach. Academic Press, New York, 1992, xiv+454 pp., $105.00. ISBN 0-12-732961-7

The principal goal of harmonic analysis of locally compact groups is that of understanding group actions on various function spaces. As examples, let X be a pseudo-Riemannian manifold and G a group of isometries of X. There is then a natural action of G on $L^2(X)$. Assume that the Laplace-Beltrami operator ω on X is selfadjoint. In this case the group will preserve the spectral decomposition of the Laplace-Beltrami operator; further, in the case that G acts transitively on X, any G-invariant subspace will be left invariant by ω. Hence, the decomposition of G on $L^2(X)$ is intimately related to the spectral problem for ω. Note that in this setting if we take G to be the group $O(n, \mathbb{R})$ of real $n \times n$ orthogonal matrices and $X = S^{n-1}$ to be the unit sphere in $\mathbb{R}^n$, we are led to classical Fourier series when $n = 2$ and to spherical harmonics when $n = 3$.

In the first volume of this (to date) two-volume series, the author introduced a class of real reductive Lie groups, investigated their structure, and parametrized a large class of their representations (homomorphisms of the group into the bounded operators of some topological vector space). The goal of the two-volume set is the proof of the Harish-Chandra Plancherel theorem for reductive Lie groups. This theorem has many guises; however, for this exposition it is best thought of as showing that any "rapidly decreasing" function can be recovered from its Fourier transform. In this form the Plancherel theorem contrasts sharply with the "abstract Plancherel theorem", which is presented in Chapter 14 of Volume II. The abstract Plancherel Theorem states that if we let G be a reductive Lie group of the type defined in Volume I and if G acts on the $L^2(G)$ via any of the natural actions, then this (unitary) representation can be decomposed into a direct integral over the equivalence classes of irreducible unitary representations of G. Irreducible means the only closed subspaces left invariant by all the operators coming from G are the whole space and the trivial subspace, and unitary means that the representation is a homomorphism of G into unitary operators on some fixed Hilbert space. The measure involved in this direct integral decomposition is called the *Plancherel measure.* Interestingly, this measure can have both a continuous and a discrete part (unlike the examples $L^2(S^{n-1})$ with $n = 2, 3$). Those representations which correspond to the atoms of the Plancherel measure are called *Discrete Series Representations.* They are Hilbert space representations, and their matrix elements relative to any orthonormal basis are called *cusp forms.* This abstract theorem arises via the representation theory of C^*-algebras and is simply an existence theorem. But because of the parametrization occurring in Volume I and referred to above, one can actually obtain an explicit formula for this measure in terms of the existing parameters. This is the focus of Volume II. The Plancherel Theorem has a number of applications; Chapter 14 is one such application, which gives the Plancherel-decomposition of certain L^2-spaces of Whittaker functions which play an important role in the study of automorphic forms.

The book provides complete details of this important result. The proof of the result does not faithfully follow Harish-Chandra's original proof; rather, it uses several results of Wallach and his collaborators. This allows the author to introduce a number of interesting topics. Principal among these are the Vogan-Wallach theory of Harish-Chandra's c-functions (Chapter 10) and the Casselman-Wallach C^∞-globalization of Harish-Chandra $(\mathfrak{g}, K)$ modules (Chapter 11).

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