Chapter 1. Introduction	5
<ul><li>Chapter 2. Basics about Lie Groups and Homogeneous Spaces</li><li>2.1. Definitions, Invariant Vector Fields and Forms</li><li>2.2. Invariant Volume Forms and the Modular Function</li><li>2.3. Homogeneous Spaces</li></ul>	7 7 10 12
<ul> <li>Chapter 3. Representations, Submodules, Characters and the Convolution</li> <li>Algebra of a Homogeneous Space</li> <li>3.1. Representations and Characters</li> <li>3.2. Definitions and Basic Properties of the Convolution Algebra</li> <li>3.3. Isotropic Functions and Approximations to the Identity</li> <li>3.4. Symmetric and Weakly Symmetric Spaces</li> </ul>	23 23 28 33 36
Chapter 4. Compact Groups and Homogeneous Spaces 4.1. Complete Reducibility of Representations 4.2. The $L^2$ Convolution Algebra of a Compact Space	39 39 48
Chapter 5. Compact Symmetric and Weakly Symmetric Spaces 5.1. The Decomposition of $L^2(G/K)$ for Weakly Symmetric Spaces 5.2. Diagonalization of Invariant Linear Operators on Compact Weakly Symmetric spaces 5.3. Abelian Groups and Spaces with Commutative Convolution Algebra	51 51 56 57
<ul> <li>Appendix A. Some Results form Analysis</li> <li>A.1. Bounded Integral Operators</li> <li>A.2. Spectral Theorem for Commuting Compact Selfadjoint and Normal Operators on a Hilbert Space</li> <li>A.3. Miscellaneous analytic facts.</li> </ul>	61 61 63 64
<ul> <li>Appendix B. Radon Transforms and Spherical Functions on Finite Homogeneous Spaces</li> <li>B.1. Introduction</li> <li>B.2. Finite Homogeneous Spaces</li> <li>B.3. Injectivity Results for Radon Transforms</li> <li>B.4. The Convolution Algebra of a Finite G-Space</li> <li>B.5. Finite Symmetric Spaces</li> <li>B.6. Invariant Linear Operators on Finite Symmetric Spaces</li> <li>B.7. Radon Transforms for Doubly Transitive Actions</li> </ul>	, 67 67 68 71 73 76 78
<ul> <li>Appendix C. Fiber Integral and the Coarea Formula</li> <li>C.1. The basic geometry of the fibers of a smooth map</li> <li>C.2. Fiber Integrals and the Coarea Formula</li> <li>C.3. The Lemma on Fiber Integration</li> <li>C.4. Remarks on the coarea formula and fiber integration</li> </ul>	81 81 84 86 89
<ul> <li>Appendix D. Isoperimetric Constants and Sobolev Inequalities</li> <li>D.1. Relating Integrals to Volume and Surface Area</li> <li>D.2. Sobolev Inequalities</li> <li>D.3. McKean's and Cheeger's lower bounds on the first eigenvalue</li> <li>D.4. Hölder Continuity</li> <li>Problems</li> </ul>	91 91 92 94 96 98
Bibliography	101
Index	103