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Nota di contenuto	Intro -- Preface to the First Edition -- Preface to the Second Edition -- Contents -- List of Figures -- 1 The Space P_n of Positive $n \times n$ Matrices -- 1.1 Geometry and Analysis on P_n -- 1.1.1 Introduction -- 1.1.2 Elementary Results -- 1.1.3 Geodesics and Arc Length -- 1.1.4 Measure and Integration on P_n -- 1.1.5 Differential Operators on P_n -- 1.1.6 A List of the Main Formulas Derived in Section 1.1 -- 1.1.7 An Application to Multivariate Statistics -- 1.2 Special Functions on P_n -- 1.2.1 Power and Gamma Functions -- 1.2.2 K-Bessel Functions -- 1.2.3 Spherical Functions -- 1.2.4 The Wishart Distribution -- 1.2.5 Richards' Extension of the Asymptotics of Spherical Functions for P_3 to P_n for General n -- 1.3 Harmonic Analysis on P_n in Polar Coordinates -- 1.3.1 Properties of the Helgason-Fourier Transform on P_n -- 1.3.2 Beginning of the Discussion of Part (1) of Theorem 1.3.1-Steps 1 and 2 -- 1.3.3 End of the Discussion of Part (1) of Theorem 1.3.1-Steps 3 and 4 -- 1.3.4 Applications-Richards' Central Limit Theorem for K-Invariant Functions on P_n -- 1.3.5 Quantum Chaos and Random Matrix Theory -- 1.3.6 Other Directions in the Labyrinth -- 1.4 Fundamental Domains for $P_n/GL(n, \mathbb{Z})$ -- 1.4.1 Introduction -- 1.4.2 Minkowski's Fundamental Domain -- 1.4.3 Grenier's Fundamental Domain -- Grenier's Reduction Algorithm -- 1.4.4 Integration over Fundamental Domains -- 1.5 Maass Forms for $GL(n, \mathbb{Z})$ and Harmonic Analysis on $P_n/GL(n, \mathbb{Z})$ -- 1.5.1 Analytic Continuation of Eisenstein Series by the Method of Inserting Larger Parabolic Subgroups -- 1.5.2 Hecke Operators and Analytic Continuation of L-Functions Associated with Maass Forms by the Method of Theta Functions -- 1.5.3 Fourier Expansions of Eisenstein Series -- Generalities on Fourier Expansions of Eisenstein Series -- Remarks on Maass Cusp Forms. 1.5.4 Update on Maass Cusp Forms for $SL(3, \mathbb{Z})$ and L-Functions Plus Truncating Eisenstein Series -- Maass Cusp Forms for $SL(3, \mathbb{Z})$ and L-Functions -- Langlands' Inner Product Formulas for Truncated Eisenstein Series -- 1.5.5 Remarks on Harmonic Analysis on the Fundamental Domain -- 1.5.6 Finite and Other Analogues -- 2 The General Noncompact Symmetric Space -- 2.1 Geometry and Analysis on G/K -- 2.1.1 Symmetric Spaces, Lie Groups, and Lie Algebras -- 2.1.2 Examples of Symmetric Spaces -- Plan for Construction of Noncompact Symmetric Spaces of Type III -- Type a Examples -- Type c Examples -- 2.1.3 Cartan, Iwasawa, and Polar Decompositions, Roots -- Three Examples of Iwasawa Decompositions of Real Semisimple Lie Algebras -- Examples of the Polar Decomposition -- 2.1.4 Geodesics and the Weyl Group -- 2.1.5 Integral Formulas -- Examples -- Invariant Volume Elements on the Symmetric Spaces of $GL(n, \mathbb{R})$ and $Sp(n, \mathbb{R})$ -- 2.1.6 Invariant Differential Operators -- 2.1.7 Special Functions and Harmonic Analysis on Symmetric Spaces -- 2.1.8 An Example of a Symmetric Space of Type IV: The Quaternionic Upper Half 3-Space -- 2.2 Geometry and Analysis on G/K -- 2.2.1 Fundamental Domains -- 2.2.2 Automorphic Forms -- Questions Arising from Proposition 2.2.3 -- 2.2.3 Trace Formulas -- Trace Formula for Discrete Γ Acting on the Quaternionic Upper Half Plane -- Trace Formula for Discrete Γ Acting on H_m -- Trace Formula for Γ Acting on the Siegel Upper Half Space -- References -- Index.
Sommario/riassunto	This text explores the geometry and analysis of higher rank analogues of the symmetric spaces introduced in volume one. To illuminate both

the parallels and differences of the higher rank theory, the space of positive matrices is treated in a manner mirroring that of the upper-half space in volume one. This concrete example furnishes motivation for the general theory of noncompact symmetric spaces, which is outlined in the final chapter. The book emphasizes motivation and comprehensibility, concrete examples and explicit computations (by pen and paper, and by computer), history, and, above all, applications in mathematics, statistics, physics, and engineering. The second edition includes new sections on Donald St. P. Richards's central limit theorem for $O(n)$ -invariant random variables on the symmetric space of $GL(n, \mathbb{R})$, on random matrix theory, and on advances in the theory of automorphic forms on arithmetic groups.
