Preface

This volume is a collection of twenty-five original papers and two survey articles concerning the topics on differential geometry and global analysis. Some of them were announced in the Thirty-Sixth Symposium on Differential Geometry supported by the Grant-in-Aid for Cooperative Research, no. 63302003, the Ministry of Education, Science and Cultures Japan. Among them the two survey articles can be summarized as follows.

The survey article by Urakawa presents recent developments of spectral geometry of a noncompact complete Riemannian manifold. The bottom of the (essential) spectrum of the Laplacian, the uniqueness and estimations of the heat kernel and harmonic function theory are mainly discussed. General theory of a self-adjoint operator of a Hilbert space, discreteness of the spectra in the cases of the Dirichlet, Neumann boundary problems and the free boundary problem with potential functions are presented. Then several estimates of the bottom of the essential spectra, or the whole specra of a noncompact complete Riemannian manifold are discussed. The heat kernel of a complete Riemannian manifold is constructed. Green functions, the Martin boundary and Martin's representation theory of a positive harmonic function on a hyperbolic manifold are discussed.

The survey article by Yamaguchi deals with the Lie algebra of all infinitesimal automorphisms of a differential system (or a Pfaffian system) on a manifold. An overview of the basic materials is given both on the geometry of differential systems and on the structure of simple graded Lie algebras over **R** or **C**. The symbol algebras $\mathfrak{m} = \oplus_{p<0}\mathfrak{g}_p$ of regular differential systems and their algebraic prolongations $\mathfrak{g}(\mathfrak{m}) = \oplus_{p\in Z}\mathfrak{g}_p$ (Tanaka theory) are explained in detail. The classification of gradations of a simple Lie algebra is given by means of its Dynkin or Satake diagram. By utilizing the Kostant method for the Lie algebra cohomology, it is determined when $\mathfrak{g}(\mathfrak{m})$ becomes finite dimensional and simple. This provides plenty of examples of differential systems whose Lie algebras of all infinitesimal automorphisms are simple, including historical examples of E. Cartan for exceptional simple Lie algebras.

On behalf of the Organizing Committee I would like to express our