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<<代数几何入门>>

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前言

These notes grew out of a course at the University of Jyvaskyla in Jan-uary 1996 as part of Finlands new graduate school in mathematics. The course was suggested by Professor Karl Astala, who asked me to give a series of ten two-hour lectures entitled "Algebraic Geometry for Analysts." The audience consisted mainly of two groups of mathematicians： Ph.D. students from the Universities of Jyvaskyla and Helsinki, and mature mathemati-cians whose research and training were quite far removed from algebra.Finland has a rich tradition in classical and topological analysis, and it was primarily in this tradition that my audience was educated, although there were representatives of another well-known Finnish school, mathematical logic. I tried to conduct a course that would be accessible to everyone, but that would take participants beyond the standard course in algebraic ge-ometry. I wanted to convey a feeling for the underlying algebraic principles of algebraic geometry. But equally important, I wanted to explain some of algebraic geometrys major achievements in the twentieth century , as well as some of the problems that occupy its practitioners today. With such ambitious goals, it was necessary to omit many proofs and sacrifice some rigor. In light of the background of the audience, few algebraic prerequisites were presumed beyond a basic course in linear algebra. On the other hand, the language of elementary point-set topology and some basic facts from complex analysis were used freely, as was a passing familiarity with the definition of a manifold. My sketchy lectures were beautifully written up and massaged into this text by Lauri Kahanpaa and Pekka Kekallainen. This was a Herculean effort, no less because of the excellent figures Lauri created with the computer.Extensive revisions to the Finnish text were carried out together with Lauri and Pekka; later Will Traves joined in to help with substantial revisions to the English version. What finally resulted is this book, and it would not have been possible without the valuable contributions of all members of our four-author team. This book is intended for the working or the aspiring mathematician who is unfamiliar with algebraic geometry but wishes to gain an appreciation of its foundations and its goals with a minimum of prerequisites. It is not in-tended to compete with such comprehensive introductions as Hartshornes or Shafarevichs texts, to which we freely refer for proofs and rigor. Rather, we hope that at least some readers will be inspired to undertake more se-rious study of this beautiful subject. This book is, in short, An Invitation to Algebraic Geometry.

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内容概要

本书旨在深层次讲述代数几何原理、20世纪的一些重要进展和数学实践中正在探讨的问题。
该书的内容对于对代数几何不是很了解或了解甚少，但又想要了解代数几何基础的数学工作者是非常有用的。
目次：仿射代数变量；代数基础；射影变量；Quasi射影变量；经典结构；光滑；双有理几何学；映射到射影空间。
读者对象：本书适用于数学专业高年级本科生、研究生和与该领域有关的工作者。

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章节摘录

The remarkable intuition of the turn-of-the-century algebraic geometerseventually began to falter as the subject grew beyond its somewhat shakylogical foundations. Led by David Hilbert, mathematical culture shiftedtoward a greater emphasis on rigor, and soon algebraic geometry fell outof favor as gaps and even some errors appeared in the subject. Luckily,the spirit and techniques of algebraic geometry were kept alive, primarilyby Italian mathematicians. By the mid-twentieth century, with the effortsof mathematicians such as David Hilbert and Emmy Noether, algebra wassufficiently developed so as to be able once again to support this beautifuland important subject. In the middle of the twentieth century, Oscar Zariski and Andr Weilspent a good portion of their careers redeveloping the foundations of alge-braic geometry on firm mathematical ground. This was not a mere processof filling in details left unstated before, but a revolutionary new approach,based on analyzing the algebraic properties of the set of all polynomial func-tions on an algebraic variety. These innovations revealed deep connectionsbetween previously separate areas of mathematics, such as number the-ory and the theory of Riemann surfaces, and eventually allowed AlexanderGrothendieck to carry algebraic geometry to dizzying heights of abstrac-tion in the last half of the century. This abstraction has simplified, unified,and greatly advanced the subject, and has provided powerful tools usedto solve difficult problems. Today, algebraic geometry touches nearly everybranch of mathematics. An unfortunate effect of this late-twentieth-century abstraction is that ithas sometimes made algebraic geometry appear impenetrable to outsiders.Nonetheless, as we hope to convey in this Invitation to Algebraic Geome-try, the main objects of study in algebraic geometry, affine and projectivealgebraic varieties, and the main research questions about them, are asinteresting and accessible as ever.

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