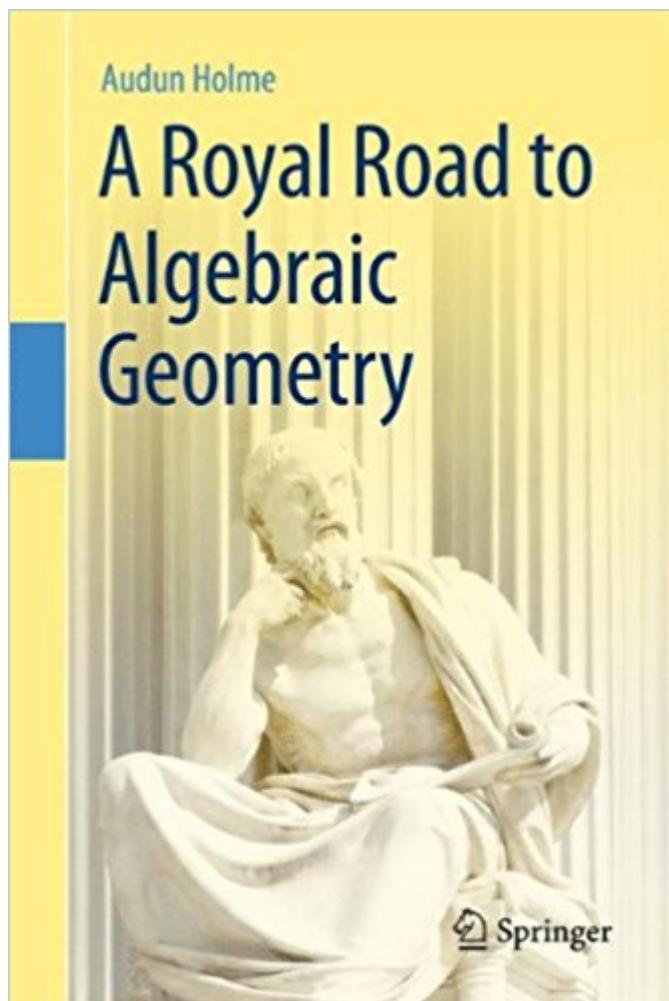


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# A Royal Road To Algebraic Geometry



## Synopsis

This book is about modern algebraic geometry. The title *A Royal Road to Algebraic Geometry* is inspired by the famous anecdote about the king asking Euclid if there really existed no simpler way for learning geometry, than to read all of his work *Elements*. Euclid is said to have answered: “There is no royal road to geometry.” • The book starts by explaining this enigmatic answer, the aim of the book being to argue that indeed, in some sense there is a royal road to algebraic geometry. From a point of departure in algebraic curves, the exposition moves on to the present shape of the field, culminating with Alexander Grothendieck’s theory of schemes. Contemporary homological tools are explained. The reader will follow a directed path leading up to the main elements of modern algebraic geometry. When the road is completed, the reader is empowered to start navigating in this immense field, and to open up the door to a wonderful field of research. The greatest scientific experience of a lifetime!

## Book Information

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## Customer Reviews

From the reviews: “The book sets out on a project to convey the big ideas of algebraic geometry in the 21st century in a way that will be accessible and that will get to get to the big ideas (relatively) quickly. The topics give a good overview of modern algebraic geometry, and I think that a reader who is interested in getting quick statements of theorems will find a lot to like in this book.” • (Darren Glass, The Mathematical Association of America, August, 2012) “The book under review offers a first introduction to algebraic geometry of a special kind . quite a variety of topics from

modern algebraic geometry is presented to the reader, often in a sketchy or survey-like manner, but always with hints for further reading. The sections of the single chapters are mostly short, and the presentation is nowhere lengthy or tedious. | the book must be seen as a charming invitation to algebraic geometry, along some sort of "royal road" (of pleasure and diversity). • (Werner Kleinert, Zentralblatt MATH, Vol. 1237, 2012)

This book is about modern algebraic geometry. The title *A Royal Road to Algebraic Geometry* is inspired by the famous anecdote about the king asking Euclid if there really existed no simpler way for learning geometry, than to read all of his work *Elements*. Euclid is said to have answered: "There is no royal road to geometry." • The book starts by explaining this enigmatic answer, the aim of the book being to argue that indeed, in some sense there is a royal road to algebraic geometry. From a point of departure in algebraic curves, the exposition moves on to the present shape of the field, culminating with Alexander Grothendieck's theory of schemes. Contemporary homological tools are explained. The reader will follow a directed path leading up to the main elements of modern algebraic geometry. When the road is completed, the reader is empowered to start navigating in this immense field, and to open up the door to a wonderful field of research. The greatest scientific experience of a lifetime!

The content of this book is good. One can learn some basic knowledge about AG. But there are too many typo. For example, in page 23, there are two nearly duplicate paragraphs says " We also give another curve...

Holme has written a singular text, one which, in my view, could very well become standard material for undergraduates and non-algebraists. Academic works are often marked by relatively poor writing, but this is not the case with this book. While the author is no Fitzgerald or Hemingway, but he is clear and at times in this book even somewhat literary. Unfortunately, there are quite a few spelling and grammar errors, but they are inconsequential. Pedagogically, Holme manages to retain a complete, logical presentation but do so in such a way as to avoid complete, often very complicated proofs. In this way, the present text truly presents a "royal road" to the subject. The approach is an interesting mixture of historical and logical; Holme always has the student in mind. Part 1 covers what one might think of as truly "classical" material which is very much geometric in nature and some of which one might expect to find in a different setting entirely (i.e. not in a course or book on algebraic geometry), whereas Part 2 covers the more algebraic and theoretical approach

of Grothendieck using schemes (this is what most think of algebraic geometry as being). While nothing as exotic or modern as tropical geometry is presented, Holme has, quite remarkably, included a non-trivial amount of intersection theory, cohomology, and other topics of great interest. Another interesting aspect of A Royal Road ... is that it presents much of the prerequisite algebra and does not seem to assume the reader has an extensive algebraic background. For instance, Part 2 begins with coverage of basic category theory; moreover, much of the requisite commutative and homological algebra is covered, albeit in brief. In my initial review, I gave 5 stars, but I have since changed it to 4. Part 2 does what it sets out to do, but I feel many students may feel that the treatment of category theory is somewhat too terse, and, perhaps more importantly, they will find themselves searching for examples and exercises only to realize there are none. Perhaps this suggests that this text is best used in conjunction with a classic text, if only to use said text as a source of problems and examples. This book is suitable for the advanced undergraduate student, graduate student, or mathematician not working in algebra or algebraic geometry. It is difficult to trace down the precise prerequisites, but one should have a mastery of "elementary" (read: high school) mathematics as well as basic linear and abstract algebra such as that found in a first course. Additional exposure to algebra (e.g. via Lang's classic text) will be helpful, and perhaps one should have an additional resource for such things, as the text may present the needed algebra somewhat rapidly for some. Experience with geometry beyond that learned in high school, especially projective or differential geometry, will be helpful for additional motivation, though Holme does do better than many standard texts at helping the student with less experience with such things understand why one should care about the subject at hand. Complex analysis (at the level of Ahlfors) may also be nice to have seen before but certainly not required. One would do well to follow up a reading of this with a standard reference such as Hartshorne or Mumford's "Red Book" to ensure (s)he knows all the details and to have more examples and problems readily available. After this, one could either read monographs and other advanced texts on material more near to modern research than typical expository texts, or resort to academic papers, reading review articles as needed. An alternative approach may be to read material in adjacent fields such as differential geometry to gain a more complete view of the involved mathematics. NOTE: I have yet to read the entirety of this text, so I am admittedly writing this review somewhat prematurely. Also, my research largely lies in algebraic geometry, so this is not a student's perspective.

I received the book in perfect conditions. Everything is ok. Thank you

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