

BOOK REVIEW

Book title: *Quadratic Diophantine Equations*, Springer, New York, 2015.

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Quadratic Diophantine equations form a popular topic, even known to non-mathematicians. Essentially reduced to the general Pell's equations $x^2 - Dy^2 = N$, they show up in concrete problems in nature and in mathematical context, sometimes quite unexpectedly. The authors have written several books and problem-books on discrete mathematics and number theory. The book under review is a continuation of their previous book "An Introduction to Diophantine Equations-A Problem Solving Approach" (Birkhauser, 2011). T. Andreescu and D. Andrica have published two other books "104 Number Theory Problems" (Birkhauser, 2006) and "Number Theory : Structures, Examples, and Problems" (Birkhauser, 2009) containing topics and problems that also show up in the present book. It indeed contains all one would ever want to know about this special class of Diophantine equations and probably more, since it keeps surprising the reader with several unexpected applications or connections to interesting problems. The authors have chosen, like in their previous books, a format of a textbook with a basic approach, gradually building up knowledge, definitions, properties, theorems, as it is commonly done in a calculus or algebra course for beginning university students. Reader friendliness has been an important aspect taken into account by the authors, in the sense that some material could be understood even by non-specialists in the field. There are many illustrations, examples, and applications, which keep the reader/student alert. The book is organized into seven chapters and moves gradually from the history and motivation of quadratic Diophantine equations to more complicated equations and their applications. In many sections the history of the advances and the problems that still remain open are also given, together with comments. Most of the theorems are proved in a clear way. This is a treasure trove of results, formulas, and connections with other mathematical concepts, that make the book unique. It is a unique publication, having an outstanding amount of information available on this topic. It will be of great interest to number theorists, professional as well as amateurs. It could be used as a textbook, but I doubt that there is a curriculum that will put this amount of number theory on a rather specific subject in a first or second year at the university. Of course it is perfectly possible to select only some chapters to teach from. That is precisely the value of the book under review, and what makes it especially interesting as a text book on elementary number theory. The material

is organized in a consistent way, making it very pleasurable for the readers to learn about one of the most classical theories developed in number theory. In addition, the necessary algebraic and analytical background is introduced, making the text very accessible.

The book provides a self-contained presentation of a very essential domain of Number Theory which guides the reader from an undergraduate to a research level of Mathematics. I strongly recommend this book for libraries, students and Mathematics enthusiasts.

We conclude this review with Preda Mihailescu's words from his Foreword of this book : *We let the reader discover the unexpected applications and connections between Pell's equations and so many, surprising, problems, and decide which he or she finds most interesting and appealing. The book generously offers for all tastes.*

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