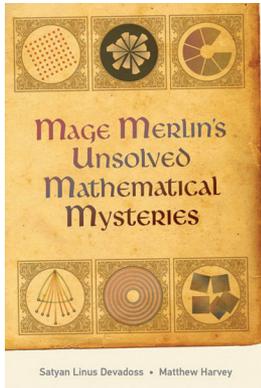




# BOOKSHELF

New and Noteworthy Titles on our Bookshelf  
February 2022



Cover is courtesy of MIT Press.

## *Mage Merlin's Unsolved Mathematical Mysteries*

by Satyan Linus Devadoss and Matthew Harvey

*Mage Merlin's Unsolved Mathematical Mysteries* is a fun and engaging collection of 16 unsolved math problems. The problems are initially presented as though encountered by Merlin from Camelot. Each problem is prefaced by our fictional guide

Maryam, a descendant of Merlin who developed her love of mathematics by working on these, and other, math puzzles. She is named after Maryam Mirzakhani.

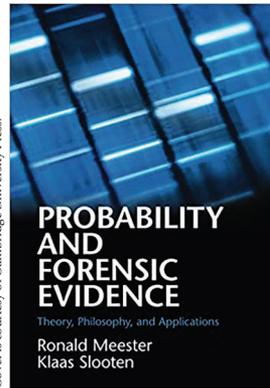
The problems cover a wide range of mathematical topics including number theory, graph theory, and geometry. Each problem can be stated simply and yet remains unsolved. After the statement of the problem, a couple pages of background information or relevant recent progress on the problem are given. The problems presented have origins that span from ancient civilizations to the twentieth century. Early in the text, the question of whether there are infinitely many twin primes is asked and the historical discussion traces the roots of studying primes back to Euler. The collection ends with a mystery about the fate of an iterative algorithm (the Collatz algorithm) which was developed in 1937.

This is a great book for a high school student who loves puzzles. One of the goals of the book is to help excite mathematical curiosity in young folks and to show them that math goes far beyond the algorithmic manipulations they often learn in school. Who knows, maybe the next Field medalist will begin their mathematical career after getting hooked on one of these simply stated, yet long-open problems!

*The Bookshelf is prepared monthly by Notices Associate Editor Katelynn Kochalski.*

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*Suggestions for the Bookshelf can be sent to [notices-booklist@ams.org](mailto:notices-booklist@ams.org).*



Cover is courtesy of Cambridge University Press.

## *Probability and Forensic Evidence*

*Theory, Philosophy, and Applications*

by Ronald Meester and Klaas Slooten

We have all heard that no two people have the same fingerprints. The question is whether or not we are guaranteed to find the difference between two fingerprints given our current technological limitations. Questions like this are best approached with forensic science which uses probability

and statistics to make decisions regarding the implications of evidence. The book *Probability and Forensic Evidence* contains a detailed description of forensic science and its relationship to mathematics.

The book begins with a philosophical discussion about probability, specifically what  $P(A)$  means. It presents two approaches. The *frequentist* approach, which most of us are familiar with, defines  $P(A)$  to be the proportion of times an outcome in  $A$  occurs out of a large number of independent trials. The second approach is the *epistemic* approach, which is subjective and varies according to the individual. Here  $P(A)$  reflects the extent to which an individual believes that event  $A$  occurred based on the information that the individual has. For instance, after being presented with evidence, each juror may have a different level to which they are certain of the defendant's guilt. The frequentist view is problematic in criminal trials where you cannot assume that repeated, independent trials occur since no two legal cases are exactly the same. For this reason, we must adopt the epistemic definition of probability which requires reassessing some probabilistic tools, including those used for hypothesis testing. Topics explored in the book include Bayesian statistics, likelihood ratio, measurement error, Bayesian networks, and a mathematical dive into DNA matching, with applications to existing practices and tried cases interspersed.

This book is accessible to anyone with at least an undergraduate background in probability and statistics. It provides an example of applied math being utilized in the real world while being mindful of the gap that can occur between practice and theory. The diligent reader will find much to learn and enjoy throughout.