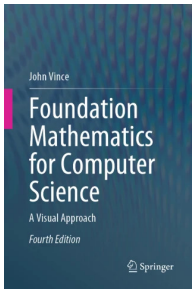
Review of [1]



Foundation Mathematics for Computer Science
A Visual Approach
John Vince

Springer Nature Switzerland, 2024
$69.99 Paperback, $59.99 eBook, 342 pages

Review by
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1 Overview

This book is a wide-ranging overview of much of the mathematics used in computer science from the basics through, and with an emphasis on, computer graphics. The coverage of the large numbers of topics means that said coverage is shallow. Some topics (Fermat's Little Theorem, continued fractions) are just tossed in with little or no discussion. This trade-off has both pluses and minuses. Everything mentioned is something that a computer science major should be familiar with, yet insight into its nature and significance will require looking elsewhere. This book emphasizes calculation, with worked examples at the end of every chapter. However, it does not provide homework problems.

2 What's in the Book?

This is a long, heavy book. It has 26 chapters and two appendices in 638 pages. Which means that each chapter is quite short. The first nine chapters, through page 177, cover the basics, numbers from an introductory mathematical perspective and then from a computational perspective, logic, then combinatorics, probability, and statistics, and then a chapter on modular arithmetic. Starting with chapter 10, the book leaves discrete mathematics behind and moves on to the mathematics used in computer graphics.

Despite the length and number of topics, Vince does not cover the mathematics used in cryptography, AI, or quantum computing.

3 Criticisms

I found a lot to criticize here, so let me start by saying that I think there's also a lot to like here. The approach of presenting the basics, throwing out some complicated ideas without much explanation,

and grinding through examples makes this book useful to people needing a quick preview of the covered material, or as a review of material learned or seen in the past. But.

The book has an enormous flaw for an American audience: it is written in British English. Thus exponents are "indices", GCD is "highest common factor", and "revises" means reviews. The second problem is that the brevity required by the amount of material covered means that explanations are often inadequate or missing. It's an overview book, not a textbook.

I think Vince has sold himself short here. His informal introductions to and comments on technical terms/issues are often excellent, but the lack of follow-through leaves the reader with unanswered questions. I recently ran across two incorrect statements of the proof that there are an infinite number of primes: they fail to notice that one plus the product of a set of primes might be divisible by some prime not in that set. Vince not only states the proof correctly but also provides a table showing examples of one plus a product of primes being prime and of being composite. More of this sort of thing would improve the book.

4 Quibbles

I found myself wanting many sections rewritten and expanded. Again, the trade-off between brevity and coverage vs. depth forces this to be the case. There is much more that could be said, at least for the basic material, both in descriptions of the material and in explaining the use of that material.

For example, the section on number systems makes perfect sense to someone who has programmed in assembler on various architectures but needs more explanation of why doing arithmetic in various bases and complement notations is necessary.

Presumably, a reviewer who works in computer graphics would feel the same way about the latter half of the book.

Were this book divided into two and written with more depth, then specific quibbles would be worth discussing in a review, but the point of this book is to get the terms out there. Vince's intuition on what should be said in a wide-ranging overview largely agrees with mine, and my quibbles are mostly a desire for more depth.

5 Conclusions

I can't see this book being used as a textbook for an undergraduate course in the United States: the use of British terminology alone is fatal. Also, the lack of homework problems means it's not a textbook in the usual sense. But a student planning on taking a course on any of this material would find their time well spent reading this book beforehand, especially since it presents examples of calculations. It would also certainly be useful as a review of material studied years ago and not used since.