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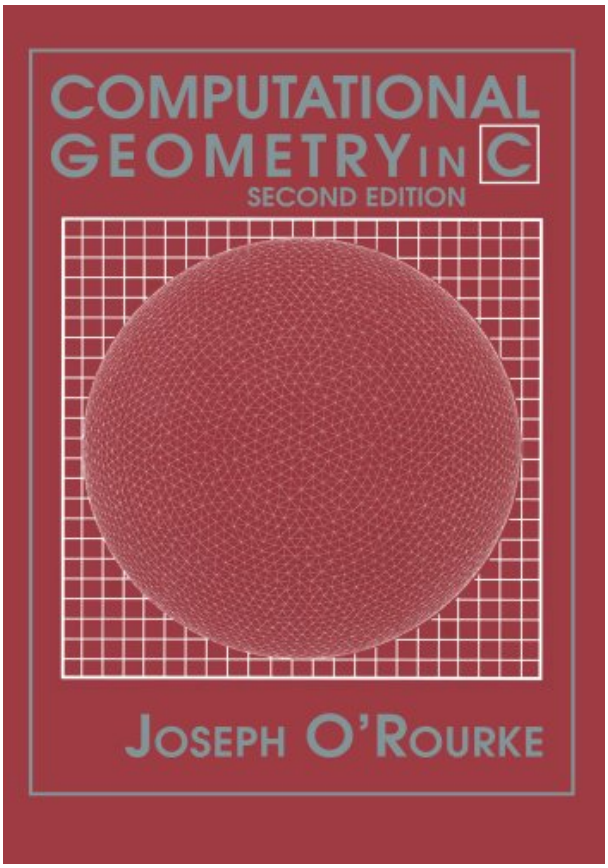

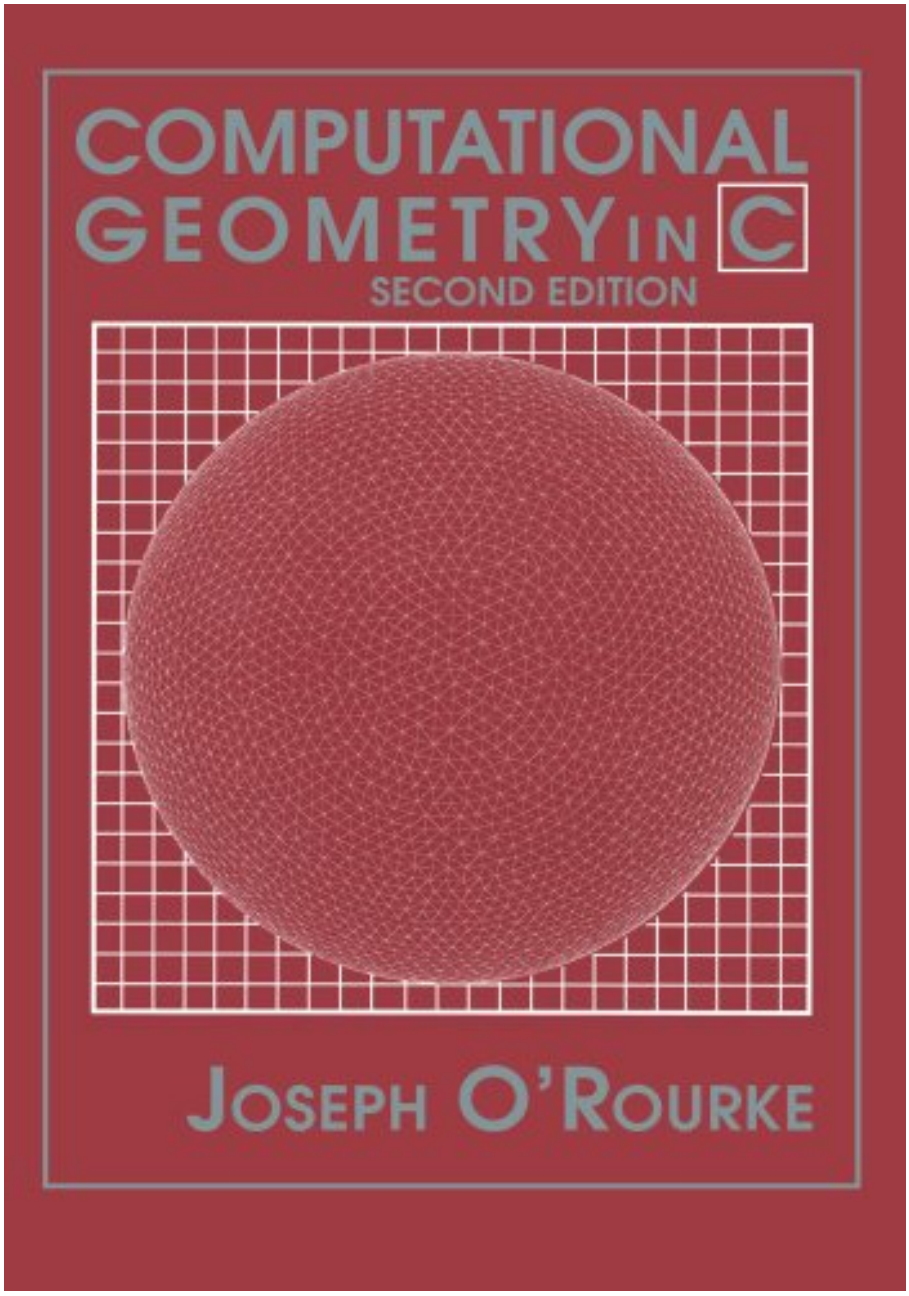

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Review

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This is the newly revised and expanded edition of the popular introduction to the design and implementation of geometry algorithms arising in areas such as computer graphics, robotics, and engineering design. The second edition contains material on several new topics, such as randomized algorithms for polygon triangulation, planar point location, 3D convex hull construction, intersection algorithms for ray-segment and ray-triangle, and point-in-polyhedron. A new "Sources" chapter points to supplemental literature for readers needing more information on any topic. A novel aspect is the inclusion of working C code for many of the algorithms, with discussion of practical implementation issues. The self-contained treatment presumes only an elementary knowledge of mathematics, but reaches topics on the frontier of current research, making it a useful reference for practitioners at all levels. The code in this new edition is significantly improved from the first edition, and four new routines are included. Java versions for this new edition are also available. All code is accessible from the book's Web site (http://cs.smith.edu/~orourke/) or by anonymous ftp.

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Most helpful customer reviews

15 of 15 people found the following review helpful.
Very hepful
By Dr. Lee D. Carlson
Anyone who is involved in areas such as computer graphics, computational radiology, robot vision, or visualization software should have a copy of this book. The author has done a fine job of introducing the most important algorithms in computational geometry, choosing the C language for their implementation. The choice of C might be somewhat dated now, since C++ is now beginning to dominate computational geometry, but readers who are actually programming these algorithms using C++ can easily extend the ones in the book to C++. Not all of the algorithms in the book are implemented into C, unfortunately, but the clarity of presentation is done well enough to make this implementation a fairly straightforward task. My interest in the book came from a need to design and implement algorithms for polyhedra in VRML and toric varieties in algebraic geometry. This book, along with others, was a great help in that regard. The running time of these algorithms was not really an issue with me, so the detail the author spends on discussing the complexity of the algorithms was not a concern. Readers who need to pay attention to running-time issues will appreciate his discussion of them for the algorithms that are presented.
The ability to visualize objects in an abstract subject like algebraic geometry boils down to, in the case of toric varieties, to a consideration of how to manipulate polytopes geometrically. A major portion of the book, if not all of it, is devoted to the computational geometry of polyhedra. Because it is an introductory book, some more advanced topics, such as Bayesian methods to find similarities between polyhedra, and neural network approaches to classifying polyhedral objects are not treated. Readers who need to do such things will be well-prepared for them after a study of this book. In addition, there are good exercises assigned at the end of each chapter, so the book could be used in the classroom. Some readers will however choose to use it as a reference source, and it would be a good one, for the author gives references to topics that he only touched upon in the book.
Some particular areas that were treated especially well were: 1. The discussion on data structures for surfaces of polyhedra. Although not very general, since he choose to deal with only triangulated polytopes, readers who need to be more general will have a good start in this discussion. 2. The discussion on volume overflow and how to deal with it using robust computation. 3. The discussion, albeit short, of the randomized incremental algorithm. 4. The treatment on the minimum spanning tree and Kruskal's algorithm. Communication network performance optimization is now a major application of this algorithm and others in graph theory, including the author's later discussion of Dijkstra's algorithm.

11 of 13 people found the following review helpful.
Nice balance of theory with code
By Jason
This book was pleasantly surprising: I had expected to see code presented with minimal motivation or discussion of the underlying ideas -- something of a "Computational Geometry for Dummies" sort of book. That's not the case at all. This is a bona fide textbook on the subject, suitable for an undergraduate course.
It covers all of the the "classical" topics: convex hulls, line segment intersection, polygon triangulation, Voronoi diagrams, motion planning.
The mode of presentation -- supporting a discussion of the theories with implementable code -- is actually a bit refreshing. For comparison: Other books, when discussing the line segment intersection problem (ie: Given a set of line segments, find all of their intersection points) simply assume that computing the intersection of a pair of segments can be done in constant time. This is not an especially difficult problem, but the discussion seems more complete with a brief description of how this might be done. The same can be

said about other primitive tests and operations in other algorithms.
Overall, this book can stand alone as an excellent introduction to computational geometry, but a serious student in the subject will want more: perhaps Preparata and Shamos or de Berg et. al.

4 of 4 people found the following review helpful.
Excellent text, obfuscated code
By Zeljko Vrba
I bought this book to learn about convex hulls, voronoi diagrams and delaunay triangluations, and line arrangements. So far I have made it through the chapter on 2D convex hulls, and I must say that it is an excellently written book for learning about the covered topics in computational geometry. The text is clear easy to understand; algorithms are sufficiently detailed and illustrated to allow full implementation without needing other resources. Corner cases are meticulously covered. I also like the text because it is straight to the point, i.e., it does not spoon-feed the reader. So, although relatively short book, it contains a lot of densely packed, but still enjoyably readable, information. Illustrations are simple but excellent: they are carefully designed and very helpful for understanding the described algorithms.

I give the book four stars for two reasons.

First, the coverage of floating-poing precision issues is almost non-existant: most of the algorithms are integer-only. A survey chapter over techniques for handling FP precision issues would be *VERY* welcome. (After all, geometric algorithms are most often applied to floating-point data in the real world.) Judging by the quality of existing bibliography, I think the author would make an outstanding job on this topic. (Hint for the 3rd edition :-))

Second, I have strong objections against the coding style used in this book: the presented code is an excellent demonstration of how to obfuscate C programs by using typedefs and hungarian notation (inconsistently!) applied in postfix. (NOTE: I have 10+ years of experience in C and C++ coding, so I'm not just a "little bit confused").

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