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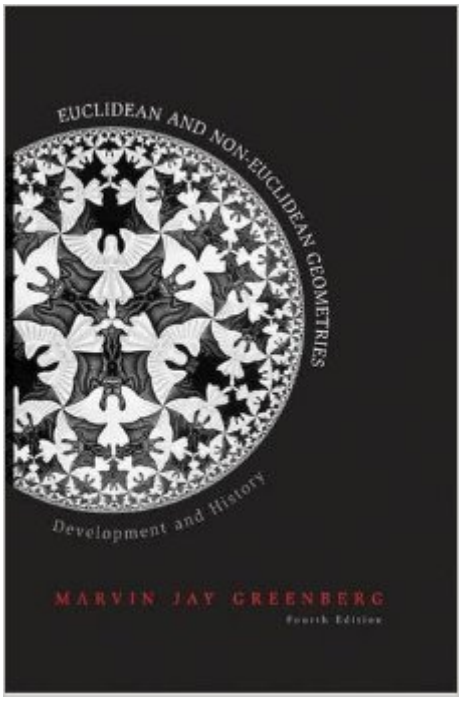
Euclidean And Non-Euclidean Geometries: Development And History



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Synopsis

This is the definitive presentation of the history, development and philosophical significance of non-Euclidean geometry as well as of the rigorous foundations for it and for elementary Euclidean geometry, essentially according to Hilbert. Appropriate for liberal arts students, prospective high school teachers, math. majors, and even bright high school students. The first eight chapters are mostly accessible to any educated reader; the last two chapters and the two appendices contain more advanced material, such as the classification of motions, hyperbolic trigonometry, hyperbolic constructions, classification of Hilbert planes and an introduction to Riemannian geometry.

Book Information

Hardcover: 637 pages

Publisher: W. H. Freeman; 4th edition (September 28, 2007)

Language: English

ISBN-10: 0716799480

ISBN-13: 978-0716799481

Product Dimensions: 6.1 x 1.4 x 9.2 inches

Shipping Weight: 2.4 pounds

Average Customer Review: 4.3 out of 5 starsÂ Â See all reviewsÂ (32 customer reviews)

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Customer Reviews

This is a full-fledged math text that I picked up on discount back when I was working at Bay Tree Bookstore in Santa Cruz. Yes, it’s taken me over ten years to finally getting around to reading it. What finally worked for me is the realization that, since I’m not taking it for a class, I don’t have to do the problems at the end of each chapter. That finally allowed me to read the book in comfort, as if I were auditing a class.This book starts with Euclid’s first axioms and leads you through the whys and whos of the development of non-Euclidean geometry. First, you get a complete re-introduction to Euclidean geometry itself, which is very handy and leads you directly to later developments. The unprovability of the Parallel Postulate (Euclid’s Axiom V) reminded me of the Ultraviolet Catastrophe in physics/chemistry history, and Greenberg shows the motivating effect this had on the mathematics community. Unfortunately, the problem wasn’t solved in a matter of decades, as with

the Catastrophe, and mathematicians poked at the Parallel Postulate as if it were a sore tooth for hundreds of years before they realized that the REALLY interesting results happened when you discarded the Postulate altogether. In fact, one of the most heartbreaking sections of the book is Greenberg's description of Girolamo Saccheri's work in the 17th century. Saccheri had discovered a type of quadrilateral that seemed able to have acute summit angles and right base angles at the same time. These are perfectly possible in what's now known as hyperbolic geometry, but the only geometry known in Saccheri's time, Euclidean geometry, made no allowances for such a strange creature. Instead of realizing what he was looking at, Saccheri abandoned this line of inquiry in disgust.

I had the pleasure of reading and studying the Second Edition of this text while in college. This course with this text was my favorite course during all of my undergraduate math courses.Being a fan of the subject, I was eager to see the new Fourth Edition of the text. The Fourth Edition is quite expanded from earlier editions, going past the wonderful main story of the Parallel Postulate - told better by Greenberg than any other author, IMHO - and diving into the different non-Euclidean geometries that "open one's eyes" by setting aside the "obvious axiom of a unique parallel". The last chapters are greatly enhanced, with a superb presentation of the issue of straightedge and compass constructions in the Hyperbolic plane.This presentation of Non-Euclidean geometry is more serious than the "popularized" books on advanced mathematical topics. If you're looking for a "light, fun" reading of this topic, this is not the book for you.I feel that the real power of the story of the maturing of intellectual thought, so brilliantly portrayed in the story of the Parallel Postulate, must be experienced, through the effort (and often hard work) of actually **doing** geometry, rather than just reading lightly about it. If you want to dive in and actual experience geometry (and the consequent rewards), then this is the book for you. The explanations are magnificent, the problems are wonderful (and, at times, very challenging), all culminating in the "wow!" of modifying the Euclidean way of thinking to a new and beautiful alternate geometrical universe.As other reviewers have noted, this text reads like a great novel - a drama involving geometry. If PBS/Nova ever make a "What does Parallel mean anyway?" show, this text will be the basis for that show.

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