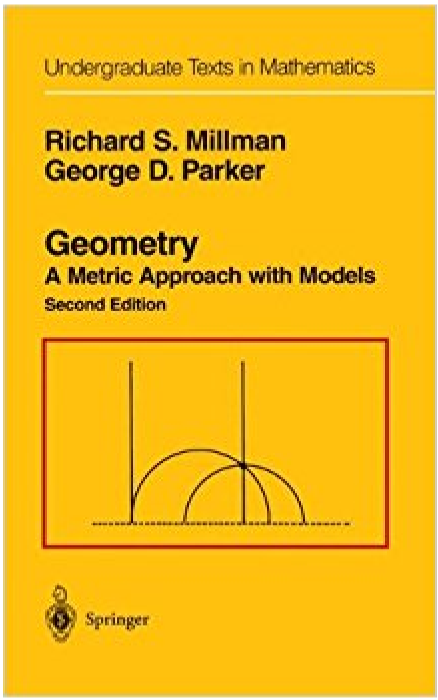
Geometry: A Metric Approach With Models (Undergraduate Texts In Mathematics)



Synopsis

Geometry: A Metric Approach with Models, imparts a real feeling for Euclidean and non-Euclidean (in particular, hyperbolic) geometry. Intended as a rigorous first course, the book introduces and develops the various axioms slowly, and then, in a departure from other texts, continually illustrates the major definitions and axioms with two or three models, enabling the reader to picture the idea more clearly. The second edition has been expanded to include a selection of expository exercises. Additionally, the authors have designed software with computational problems to accompany the text. This software may be obtained from George Parker.

Book Information

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Customer Reviews

geometry is a very appealing but difficult subject mathematically. it concerns the possible configurations of objects of various dimensions and how they meet (are "incident to") one another within a given universe.there are many ways to study it, but there is no easy way to make that study a rigorous mathematical discipline. it is so complicated that even the great mathematicians of antiquity overlooked some details that are actually very important even in flat plane geometry, not to mention spherical or elliptical geometry.to many of us geometry means the euclidean geometry we studied in school, with its list of axioms and postulates and the theorems that we had to memorize proofs for. This hallowed subject has almost disappeared from schools of today, since it resembled latin or greek too much for current tastes, i.e. one just memorized the facts with no thought as to their relevance or meaning.there were two flaws in this old subject, one it was unmotivated and of interest only to the few. second, the historical treatment actually contained several logically significant gaps, i.e. errors that were discovered a hundred or two years ago.modern books thus usually try to present geometry with more effort to make it appealing, and also with an effort to correct the logical mistakes of the ancient geometers. this is hard to do. the logical errors of the ancients are of course subtle and difficult, since the ancients who overlooked them were no slouches themselves.but geometry has always been a place where logical reasoning was practiced in a fairly simple setting, and this tradition seems valuable. the current book tries to present a logically complete and rigorous treatment of plane geometry that is both modern and clear, and well illustrated with numerous examples.the problem of axiomatizing geometry is the following: suppose we start with an example of a geometry, a physical space with sub spaces that can intersect each other, and possibly with the ability to measure angles and lengths, and we want to begin to deduce new facts about it.We need some basic principles that we can use in our reasoning, some axioms or facts that are guaranteed to be true. At the other extreme, we would like to be able to actually recognize when another geometry is essentially the same as ours by checking a few fundamental properties.So we seek to enunciate some basic facts about our geometry that encode its esential features, and we hope to find enough of these, in order to prove that no other geometry satisfies all of them. then we will have characterized our geometry uniquely.euclid had in mind a plane model of geometry that is essentially the plane R^2 of analytic geometry, except he tried to characterize it "synthetically" by axioms which did not involve length and angle measure. He and his contemporaries agonized over just which axioms were needed to completely describe it. In particular they were unsure whether the "5th parallel postulate" was really needed.It turns out they also overlooked the need for some other basic axioms concerning whether a line separates the plane into two halves or not, things so obvious they never noticed them.the intervening centuries revealed the need for these extra axioms, and also settled the fact that indeed the 5th postulate does not follow from the others, because non euclidean models were found satisfying all the other properties but not the one about parallels. so the problem for authors is how to present all this palatably to students.I suspect it is actually not possible to do so to todays students, who often have not even had a decent high school course in traditional euclidean geometry and may not even know trigonometry, much less logic or proof.Nonetheless Millman and Parker have made as good a try in this book as one could hope for. They introduce at the beginning the modern notion that an axiom system makes sense, i.e. is "consistent" if and only if there is a model in which all the axioms are true.then they build up their axiom system one axiom at a time, displaying as many models as they can for each set of axioms. the point is that the system is consistent if there is even one model, but not complete if there is more than one model. thus the ultimate goal is to find two models for the partial axiom system which omits the parallel postulate, but to prove that there is only one model, the usual euclidean plane, when that axiom is included.along the way many interesting models are displayed for various smaller sets of partial axiom systems.this is the clearest possible way to explain the whole game in my opinion. Still today's students are so unsophisticated that the goal of explaining this subject, even in this way, seems out of reach entirely.thus it is probably a better idea to only explain a small part of this material in a first course, and leave the rest until a second course. unfortunatekly the book is writtena s a logical whole, so failing to cover it all leaves the student with only a partial grasp of what is happening even in euclidean geometry.for what it tries to do this is an excellent book. but if you are trying to teach this stuff to students who have not even learned trig, and i assure you that is most college students today, you are in for a hard job.still this is my favorite college intro to euclidean geometry book, and i don t think it has a peer or superior. e.g. i do not care for greenberg's book, largely because it is less attractive on the page, but also for some conceptual flaws and tedious proofs I have noticed in teaching it. i.e. the material is not as well thought out, and is not as clearly displayed.i had considered using the great high school book on geometry by harold jacobs for my college course but apparently that too has been watered down in the 3rd edition for todays weak students.PLEASE PLEASE PLEASE, stop watering down books to accomodate weak students, thus producing weaker ones, hence needing still weaker books, etc....... ad infinitum.....fortunately this book has apparently not had enough "success" it seems to be favored with the publisher insisting on a watered down 3rd edition and is still available in the excellent 2nd edition.A word of warning: you can really get in trouble with a beginning class by going through this book in order from page one. The first 120 pages or so (chaps 1-5) is the highly technical stuff providing the subtle foundations Euclid overlooked. The interesting geometry does not get going until the next 120 pages (chaps 6-9). In a normal semester you will not gett here at all. And many of the latter proofs are just lifted from Euclid with no credit. On p.138 the authors even brag that their proof (actually Euclid's) is probably one the reader has never seen before! What a sad but true state of affairs.

It is a dissent book in Euclidean/non-Eucldean geometry.("Elementary Geometry From An Advanced Standpoint" by Moise, is better and cheaper.)Although the book is published in "Undergraduate Texts in Mathematics", it is NOT suitable for undergraduates.Well, not today, maybe it was in the past.

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