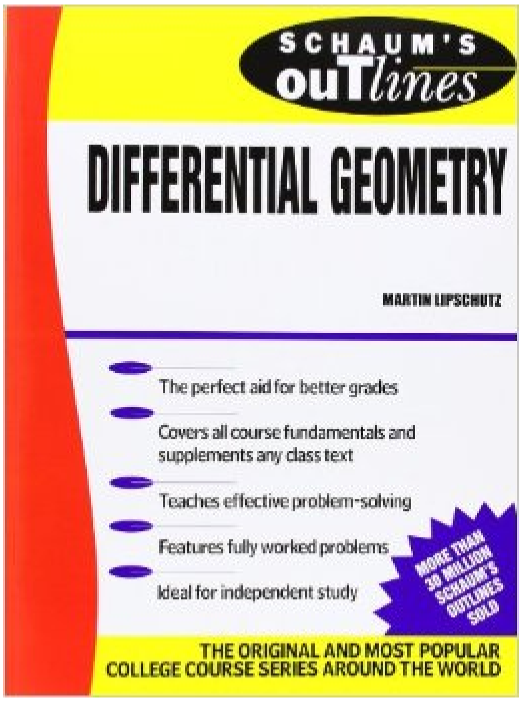
Schaum's Outline Of Differential Geometry (Schaum's)



Synopsis

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Customer Reviews

This book is intended to assist upper level undergraduate and graduate students in their understanding of differential geometry, which is the study of geometry using calculus. Usually students study differential geometry in reference to its use in relativity. I personally have a rather oddball application for the subject - modeling of curved geometry for computer graphics applications. The fundamental concepts are presented for curves and surfaces in three-dimensional Euclidean space to add to the intuitive nature of the material.The book presumes very little in the way of background and thus starts out with the basic theory of vectors and vector calculus of a single variable in the first two chapters. The following three chapters discuss the concept and theory of curves in three dimensions including selected topics in the theory of contact.Great care is given to the definition of a surface so that the reader has a firm foundation in preparation for further study in modern differential geometry. Thus, there is some background material in analysis and in point set topology in Euclidean spaces presented in chapters 6 and 7. The definition of a surface is detailed in chapter eight. Chapters 9 and 10 are devoted to the theory of the non-intrinsic geometry of a surface. This includes an introduction to tensor methods and selected topics in the global geometry of surfaces. The last chapter of the outline presents the basic theory of the intrinsic geometry of surfaces in three-dimensional Euclidean space.Exercises are primarily in the form of proofs, and there are plenty of worked examples. Since the examples are kept to no more than three dimensions, the outline contains plenty of good instructive diagrams that illustrate key concepts.

Many years after its publication, this book continues to be a valuable introduction to the differential geometry (DG) of curves and surfaces in the euclidean 3-dimensional space R^3. The text is clear and suitable for self study, since each chapter combines a serious bulk of theory and many solved exercises, as well as some unsolved problems. The work starts reviewing much of the differential calculus needed. Then, it deals with curves, defining curvature and torsion, and proving the Frenet-Serret equations. It is shown that every regular curve is detrmined by its curvature and torsion (up to a rigid motion). Many interesting problems on curves illustrate the theory. But little attention is given to plane curves and no global property of curves is given (what is quite understandable, since they are hard to prove). The book continues with surfaces, defining parametrizations, atlas, the tangent plane and the differential of a map of surfaces. Then, we find an excellent introductory exposition of curvature lines and assymptotic lines (including Meusnier, Euler, Rodrigues and Beltrami-Enneper theorems) as well as geodesic curvature, geodesic lines and Gauss curvature. The so called fundamental existence and unicity theorems for curves and surfaces in R^3 are stated and proved, as well as Gauss Theorema Egregium. However, there is no mention of parallel transport (you can find this in Stoker Differential Geometry (Wiley Classics Library), in Goetz

While the few solved problems have been carefully selected, and the topics covered continue to reflect Martin Lipschultz normal high standards of exposition, overall this volume is a sub par effort for topics in this series.The problem lies with the progression of topics, and the erratic treatment --

both of which seem to lack rhyme or reason and leaves the reader with no sense of continuity or cohesion to the substance: Why not, for instance, have "vectors" and "vector functions of a real variable," followed by "vector functions of a vector variable?" And why throw topology right into the middle of this mix? Was it only to get to the idea of Homeomorphisms? If so, should this not have been done much earlier on in the book, maybe even as early as the very first chapter, providing a smoother transition to vector functions of higher mathematical forms? Or better yet, perhaps the author should have merely mentioned the importance of elementary topology, in passing, and then referred the reader to an introductory topology textbook, or as a last resort, he could have added topology as an appendix? But not just toss it in the middle unexpectedly without explanation in an almost completely disconnected fashion. This smattering of topology just seemed so much out of place here. And in any case, it surely was insufficient to tie down the concepts needed to build the necessary bridge between topology and differential geometry. Yes, it did help in understanding the parametric representations of surfaces, but the reader still "was on his own" and had to hustle mightily to make the intended connections.