not just to convenient regions of them. Some knowledge of topology is needed for an understanding of this chapter, and Dr Willmore makes it clear that he has not attempted to give a complete account. Nevertheless this chapter is both interesting and important. The material in it should, if possible, be included in any course on differential geometry for Honours undergraduates. Indeed, Part I of the book forms an excellent basis for a course which should be undertaken by all candidates for an Honours Mathematics degree.

The second part of the book deals with differential geometry in n dimensions. A chapter on tensor algebra precedes the introduction of tensor calculus as applied to differential manifolds. Some may find the definition of tensor a little remote for practical purposes. But at least there *is* a definition of tensor, which is more than can be said for those text-books which purport to define tensors but only define tensor components. The invariance of a tensor is the most important thing about it, and Dr Willmore is quite right to stress this from the beginning. A chapter on Riemannian geometry follows, and this includes mention of some fairly recent results on topics such as harmonic Riemannian spaces. There is also a readable account of Élie Cartan's methods of investigating problems in Riemannian geometry, and this should prove most valuable to post-graduate students. Finally, there is an account of tensor methods applied to surface theory, and the greater power of these methods as compared with the vector methods of the earlier part of the book is illustrated.

This is an important, interesting and well-written book. The style is clear and unpretentious and the printing conforms to the high standard set by the Oxford University Press. E. M. PATTERSON

BIRKHOFF, G. D., AND BEATLEY, R., *Basic Geometry* (Chelsea Publishing Co., New York, 1958), 294 pp., $3.95.

This textbook has been published, following classroom experience with an experimental edition, by two professors from Harvard University. It is designed to cover a year's work in an American high school, and seems to be aimed at an age group of about 16. The emphasis is on logical deduction rather than on a list of geometrical theorems, it being assumed that this facility will be carried over to arguments dealing with " real life ".

The geometry is developed from five assumptions as follows: (1) points on any straight line can be numbered so that number differences measure distances, (2) there is one and only one straight line through two points, (3) all half-lines having the same end-point can be numbered to measure angles, (4) all straight angles have the same measure, (5) the (S.A.S.) case of similar triangles.

The number system is defined to contain all real numbers, rational or irrational, and from this basis seven theorems are derived. The geometry is then developed rapidly in the following order: (*a*) parallel lines and networks, (*b*) the circle and regular polygons, (*c*) ruler-compass constructions, (*d*) area and length, (*e*) continuous variation, (*f*) loci; the whole being rounded off by brief references to power, coaxal circles, inversion and projection.

There are numerous exercises, many being standard theorems in British textbooks. All are expected to be done, though the aid of the teacher would obviously be required in many of them. Although this book is not suitable as a textbook in this country, it has great interest in showing a development quite foreign to ideas current in our schools, and could prove very useful in the training colleges. G. ALLMAN

KEMENY, J. G., AND SNELL, J. L., *Finite Markov Chains* (D. van Nostrand Co. Ltd., London, 1960), 210 pp., 37s. 6d.

If this book is regarded from the point of view of the undergraduate at whom