Mathematical Theory of Elastic Equilibrium (recent results), by Giuseppe Grioli. Ergebnisse derangewandten Mathematik No. 7. Academic Press Inc. New York and Springer-Verlag (Berlin-Gottingen-Heidelberg), 1962. viii + 168 pages. $7.25.

This important monograph on the theory of Elasticity reports some recent results, mostly by Italian mathematicians. The major problems tackled in the book are

1) The form of the Elastic potential function is investigated under the hypothesis that there exists a stress-free state of equilibrium such that the work done by internal contact forces is negative for any isothermal non-rigid displacement starting from it, and that in this state (of free equilibrium) the body is isotropic and homogeneous.

2) The problem of static elasticity (finite deformations) is reduced to the solution of an infinite sequence of problems in linear elasticity, under the hypothesis that strains and stresses are analytic functions of a parameter θ, in the neighborhood of $\theta = 0$.

3) Some aspects of the theory are investigated in which the strain and stress tensors are assumed to be asymmetric. A simple example is given to show that certain types of stress singularities in the solutions of elasticity problems may be removed by dropping the assumption that stress tensor is symmetric.

The presentation is clear. The proofs of many theorems are omitted but this would be inevitable in a book of this size, which contains an amazing amount of information.

There are minor misprints in the book here and there.

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Anti-plane Elastic Systems, by L. M. Milne-Thomson. Academic Press, New York. Springer-Verlag, Berlin-Gottingen-Heidelberg, 1962. 265 pages.

The author calls a stress-system antiplane if there exists a fixed plane Π (called the antiplane) such that the only stress component which can depend upon distance from Π is the stress component normal to Π. Under two further assumptions namely (I) the body-field is independent of distance from the antiplane Π (II) the body-field is derivable from a potential, the author reduces the static problem of infinitesimal anisotropic elasticity to the determination of three complex stress functions which have to satisfy suitable boundary conditions.

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The results are then specialised to the case of isotropic material and half the book (chapters 3, 4, 5) is devoted to solving special problems of torsion and flexure of beams. A very large number of problems has been solved and more are given at the end of each chapter as exercises.

The last two chapters (6, 7) deal with the corresponding problems for anisotropic materials.

In chapter 6, the problem of twisting of a cylinder by an axial couple is attempted and, for an elliptic cylinder, is solved explicitly. In the particular case when the antiplane is a plane of elastic symmetry, the problem of twisting is reduced to the corresponding problem for an isotropic cylinder with a different cross section. No example is attempted to show whether this latter problem is easier.

Chapter 7 deals with cylindrical anisotropy. The problem of cylindrical tube with hydrostatic pressure is solved explicitly.

The presentation is very clear throughout the book. It is difficult to imagine it as a text-book in as much as the discussion is confined to just one problem of Elasticity with one particular technique. It is, however, a very welcome addition to the small number of books available on the subject.

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The Calculus, a genetic approach, by O. Toeplitz. University of Chicago Press, University of Toronto Press, 1963. xiv + 192 pages. $6.50.

The original German text was edited by G. Köthe, and A. L. Putnam arranged the American edition. In his preface, Toeplitz expresses the opinion that only a "genetic" i.e. an historical approach helps the student to gain a full understanding of the underlying principles in a course on Calculus. In order to promote such an understanding of the basic concepts, only some particularly significant chapters of the infinitesimal calculus need be chosen.

Thus the first chapter gives the historical development of infinite processes such as finding irrational numbers (resp. incommensurable segments), the exhaustion methods of the Greeks, Archimedes' measurement of the circle and the sine tables, $\lim_{n\to\infty}(1+\frac{1}{n})^n = e$, periodic decimal fractions, convergence of sequences and infinite series.