BOOK REVIEWS - COMPTES RENDUS CRITIQUES

Puzzles and Paradoxes. By T. H. O'Bierne. Oxford University Press, New York and London (1965). XIV+238 pp.

This book takes the reader on ten interesting strolls along well-worn trails, often turning into byways to the less familiar and sometimes making forays into new territory. The metaphor is enhanced by a somewhat pedestrian style but the promenades usually lead to material which is fresh and sometimes nontrivial.

Chapter I starts in the ninth century with jealous husbands, available wives and a river to cross. From this familiar setting, we progress to missionaries and cannibals, wolves, goats and cabbages, a father and his five hostile sons all wanting to cross the stream and all having problems with the boat. Finally, a method of solving and inventing this kind of problem using graphs.

In Chapter II, coinweighing problems of all descriptions are discussed and general solutions of most types are described.

Successive chapters deal with pouring problems, a finite geometry of twenty-five points and some ways to use it. Those colored cubes that nephews bring you to arrange in a certain order are described and a system for solving them explained. Nim and related games, the date of Easter, liars and truth-tellers, and an ancient diophantine equation are discussed in an entertaining way.

An excellent addition to the book is a list of references and source material, and a comprehensive index.

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Contributions à la Géométrie Différentielle Projective-Symplectique. By Izu Vaisman. Annalele Ştiinţifice ale Universităţii "Al. I. Cuza" of Iaşi, (1966). 126 pp.

A symplectic structure on an even dimensional vector space is a scalar-valued bilinear map which is skew-symmetric and non-singular.

A projective space of dimension m may be regarded as the set of one-dimensional subspaces of a vector space of dimension $m+1$ and coordinatized accordingly.

Starting with a $2n$-dimensional vector space with a symplectic structure one may form a $(2n-1)$-dimensional projective space with an induced "symplectic" structure. Call such a space "projective-symplectic".

The author considers C^∞ fibre bundles whose base is a $(2n$-$1)$-dimensional manifold and whose fibres are projective-symplectic spaces of dimension $2n$-1.

By introducing parallel displacements which preserve the structure of the fibres, one may pose the usual questions of Riemannian geometry in this new setting.

The first part of the book is devoted to curve-theory and, more generally, to "symplectic" distributions, which must be odd-dimensional. The last part deals with surfaces in a three-dimensional space.

Although some attempt has been made to give intrinsic and global formulations of the subject, the book makes no use of them. Thus the reader must often sort out enumerative indices from component indices. Moreover, since the principal analytical tool is the "repère mobile" of É. Cartan in its classical form, it is easy to confuse points, one-forms and vectors.

There seem to be as many definitions as theorems. Most results are direct consequences of the "fundamental theorem" of curves on surfaces, i.e., the local existence and uniqueness theorems for systems of differential equations. There are few misprints. The book seems to be intended primarily for those well acquainted with the field.

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Collected works of Hidehiko Yamabe. BY R. P. BOAZ. Gordon and Breach, New York (1967). xii+142 pp.

This book is the memorial edition for the late Professor Hidehiko Yamabe (1923–1960) who left unusually outstanding mathematical research in his short life. Here in the chronological list of his eighteen papers, one sees how wide his interests were and how great his accomplishments.

The first paper listed deals with an arcwise connected sub-group of a Lie group; the fact that the theorem obtained here served to give a rigorous foundation for the so-called holonomy theorem is now very well known. The papers entitled "On the conjecture of Iwasawa and Gleason" (Ann. of Math., **58** (1953)) and "A generalization of a theorem of Gleason" (ibid.) are believed to be his greatest contribution to mathematics. There he demonstrated that a connected locally compact group is a projective limit of a sequence of Lie groups; and, if the locally compact group has no small subgroup, then it is a Lie group. This gives a final answer to a problem called the *fifth problem of Hilbert*.

We also observe in this collection that he was interested in differential geometry. He proposed a conjecture that any simply connected, closed n-dimensional Riemannian manifold always admits an Einstein metric. It is very interesting to know that his conjecture has been affirmed by many geometers so far when and only when they are allowed to put one more additional hypothesis, and to the reviewer's knowledge there are already twenty or more papers that deal with this conjecture.