the theory of ordered groups, and contains enough material for a one semester course or seminar.

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Theory of optimal search, by Lawrence D. Stone, Mathematics in Science and Engineering, vol. 118, Academic Press, New York, 1975, xiv + 260 pp., $29.50.

That resources are limited and must be carefully allocated among competing ends, each in itself desirable, is a central fact of the world we live in. The analysis of the resource allocation problem for society as a whole has been a central concern of economic theory, while its study from more limited and more detailed perspectives has become perhaps the major focus of the field termed operations research or management science. Biological study, particularly the field of ecology and some aspects of evolutionary theory, has also put some emphasis on the resource allocation problems of living creatures; after all, Charles Darwin ascribed his notion of natural selection to the influence of the economist, Thomas R. Malthus, whose emphasis on the implications of resource limitations earned for economics the name of "the dismal science."

The book under review is a study of optimal resource allocation in a particular field, search for an object when the search process uses up scarce resources. This particular theory arose during World War II as the problem of locating enemy submarines and was studied by a group headed by the probability theorist, B. O. Koopman. Most of the subsequent interest has also been motivated by seeking submarines, including lost friendly ones. There is a considerable literature, to which the author has been a major contributor, and now we have a survey which is indeed admirable in scope and exposition.

Although the author concentrates on his particular area of resource allocation, more general problems are implied, and some of the theorems are widely applicable. Nevertheless, the search problem in its elementary forms has special features which enable stronger results to be obtained than are available generally.

The resource allocation problem with a single scarce resource can be stated as follows: Let there be a finite or denumerable set, J, of possible activities. Each can be operated at alternative levels indexed by a real number (possibly restricted to the integers, if the activity can be carried on only in discrete steps, or to some other subset of the reals). Let f be a mapping from J to the range of activity levels. If z is the activity level for the jth activity, let $c(j, z)$ be the amount of the scarce resource used in the jth activity. Hence, if f is the specification of activity levels, the total amount of the resource used is,

$$\sum_{j \in J} c(j, f(j)).$$

If the total amount of the resource is considered to be limited then we are