ing information systems. It is proposed that such systems be investigated by building mathematical models, so that their performance can be predicted quantitatively. Techniques which could be applied to the determination of similarity or relevance include symbolic logic, matrix algebra, and statistical analysis.

The emphasis, however, is almost exclusively on means for increasing the effectiveness of retrieval systems through improvements in the physical organization of files. Theories of logical organization are largely ignored except those based upon patterns of usage. In particular, the authors regard an *a priori* organization of descriptive terminology from a semantic viewpoint as being too confining and inflexible in any operational situation. Despite this, the book is one of the most informative yet to appear and is a welcome addition to the field.

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25 [X].—H. S. M. COXETER, *Regular Polytopes*, second edition, The Macmillan Company, New York, 1963, xix + 321 p., 23 cm. Price $4.50 (Paperback).

This second edition is essentially the same as the first edition of 1948, but in paperback by another publisher, with slightly larger pages and appreciably larger plates. Corrections and minor additions have been made, and six pages have been revised.

It still remains the most extensive and authoritative summary of the derivations and enumeration of the n-space generalizations of the regular and quasi-regular polyhedra. It includes their metric, topological, and group properties, and the history of their development. Although the subject of polyhedra is quite ancient, new discoveries concerning these polytopes have been made since the first edition, many by the author. Some of the new work is mentioned in the text and in the extensive bibliography.

A review of the first edition by the present reviewer appeared in *Mathematical Reviews*, v. 10, 1949, p. 261.

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26 [X].—OYSTEIN ORE, *Graphs and Their Uses*, Volume 10 of the *New Mathematical Library*, Random House, New York, 1963, viii + 131 p., 23 cm. Price $1.95.

This is an excellent introduction to graph theory. The exposition is elementary, although less so than that of most of the volumes of this series. The intended audience (for the series) of "high school students and laymen" may have some difficulty with a number of the proofs, but a reader with a little more mathematical maturity, who is seeking a simple introduction to the subject, could hardly do better.

There are nine chapters. In the list of these that follows we add in parentheses the problems to which the corresponding concepts are applied. 1. What is a Graph?

(Mostly definitions). 2. Connected Graphs (Euler lines, Paths, Mazes, Hamilton lines, Knight's Tour). 3. Trees (Connector problem, Matching vertices and edges). 4. Matchings (Assignment problems, Marriage Problem, Round-Robins). 5. Directed Graphs (One-Way Traffic, Genetic Graphs). 6. Questions concerning Games and Puzzles (Puzzles, Theory of Games, Sportswriter Paradox). 7. Relations (Use of graphs to illustrate different types of relations). 8. Planar Graphs (Kuratowski Criterion, Euler's Formula, Platonic Bodies, Mosaics). 9. Map Coloring (The Five-Color Theorem).

There are many problems. Their solutions and a glossary are given in the appendix. One of the definitions in the latter has an interesting error: "*Dodecahedron.* A polyhedron of twenty faces." Is it typographical, or did he multiply when he should have added?

D. S.

27 [X].—S. VAJDA, *Readings in Mathematical Programming*, second edition, John Wiley & Sons, New York, 1962, viii + 130 p., 22 cm. Price $4.25.

This book is a revised edition of *Readings in Linear Programming*, which was first published in 1958. The title of the present edition reflects the inclusion of applications dealing with discrete linear, dynamic, and quadratic programming.

Two methods are described for solving the Hitchcock transportation problem; namely, the stepping-stone method and a network flow algorithm developed by Ford and Fulkerson. The formulation and solution of several problems in terms of a transportation model are given. In addition, variants of the transportation problem are reduced to the problem of determining a maximal flow through a network, which is solved by the Ford-Fulkerson maximal flow algorithm. The simplex method and the dual simplex method are introduced for solving the general linear programming problem. The simplex calculations are described in terms of a tableau. Many examples are provided to elucidate the details of the computational procedures involved. The concept of dynamic programming is exemplified by two simple problems involving multi-stage planning. Only linear objective functions are considered. The discussion of the application of linear programming to game theory is addressed to those who are familiar with the concept of a zero-sum two-person game.

Two types of discrete linear programming examples are presented: (1) the condition of integrality is imposed on all variables; and (2) the condition of integrality is imposed only on some specified variables. The treatment is based on the methods of R. E. Gomory.

The subject of quadratic programming is restricted to an exposition of two methods, one due to P. Wolfe, the other to E. M. Beale. These methods are applicable to the case in which the constraints are linear, but the objective function is convex quadratic.

Except for the chapter on game theory, elementary algebra is the only prerequisite for an understanding of the material presented in this book. Emphasis throughout the book has been placed on the details of specific algorithms rather than on the fundamental concepts underlying the various methods. Although the author has presented excellent representative examples of the manifold applications