The editors have combined the papers of both symposia, and have ordered them here without regard to the particular symposium at which they were given, and with no indication of that symposium. The title of the volume similarly reflects this loss of precision. In extenuation, it must be said that the resultant fuzzing of two admirably precise and important subjects stems mostly from the fact that more than one of the speakers did not really speak to the point. They presented "papers." Perhaps it could even be said that these were good papers. Still, the willingness to disregard the title of the symposium seems to this reviewer an attitude that should be corrected.

Consider the subject of the second symposium. That seems clear enough. Ideally, a paper here would examine a chain of theoretical and computational problems that led from one to the other and then back at a higher level. Such chains are surely known. Had every speaker presented material of this type, it could then be hoped that the commentators would attempt to generalize these experiences and formulate a resulting scientific methodology. The symposium was of value, but was not that successful. Surely, though, this is a subject of great scientific importance. If mathematicians are to learn to consistently use computers as scientific tools (say, in the way Ernest Rutherford used physical equipment) and not merely to obtain scattered results, a study of such interactions remains a prime necessity.

Some speakers at the second symposium, such as Zassenhaus and Lehmer, did speak directly to the point. But others did not. Likewise, Rosser and Charney spoke directly to the point of the first symposium.

For all that, the volume is certainly of value.

D. S.

62[Z].—FRANZ L. ALT & MORRIS RUBINOFF, editors, *Advances in Computers*, Volume 3, Academic Press, New York, 1962, xiii + 361 pp., 23 cm. Price $12.00.

This third annual volume of *Advances in Computers* serves well to cover a number of additional areas in the computer field. Subjects include the Computation of Satellite Orbit Trajectories, Alternating Direction Implicit Methods, Recent Developments in Nonlinear Programming, Multiprogramming, Combined Analog-Digital Techniques in Simulation, and Information Technology and the Law.

S. D. Conte's contribution on the calculation of satellite orbit trajectories considers the problems of both predicting and determining such orbits. He presents a lucid survey and evaluation of methods of numerically integrating the equations of motion for a satellite moving under the influence of a central body force and subject to various perturbative forces. There is a careful discussion of various accuracy tests, including methods of estimating truncation and roundoff error accumulation. Results of a numerical study are presented which compare the computational efficiency of various methods. The problem of determining satellite orbits based on data received during launching and subsequent tracking is considered. In addition, building blocks for a comprehensive orbit prediction and determination computer program package are outlined.

Alternating-direction implicit methods constitute in many cases the best methods available to us today for solving large systems of elliptic and parabolic partial difference equations. G. Birkhoff, R. S. Varga, and D. Young present an excellent review of the status of the problem of providing a rational explanation of their

effectiveness for the solution of systems of linear elliptic difference equations in the plane. Included is a survey of theoretical results comparing the effectiveness of alternating direction methods with systematic overrelaxation methods. In addition, results of some systematic numerical experiments performed to test the comparative effectiveness of the various methods are presented.

P. Wolfe's paper, Recent Developments in Nonlinear Programming, surveys methods of solving programming problems which involve maximizing a concave objective function subject to a set of constraints specified by inequalities which taken together specify a convex set. The lack of information concerning the relative computational efficiency of many of the methods is pointed out.

E. F. Codd defines multiprogramming as "the technology associated with the concurrent execution of instructions which are not restricted to being immediate neighbors in any instruction string." He discusses the role which multiprogramming can play in various environments. A system for "batch multiprogramming" on a STRETCH-like system with one processing unit is outlined. Problems associated with scheduling runs and allocating parts of the computer system to various programs in order to minimize the running time for a set of runs are considered. Finally, multiprogramming system requirements are reviewed in the case where two or more processing units are involved, and the implementation of multiprogramming systems in this case is discussed.

H. K. Skramstad, in a chapter entitled Combined Analog-Digital Techniques in Simulation, surveys a number of interconnected analog-digital systems. He indicates some areas of applying such systems as well as some methods of combining them.

R. C. Lawler's stated purpose in a report on Information Technology and the Law is "to provide an overview of the activity occurring at the interface between information technology and law and to suggest which problems may be most significant from the standpoint of the lawyer, the courts, and the public as a whole." A broad range of subjects is included from the use of computers in the retrieval of legal information and in predicting court decisions to some of the legal problems posed by the use of information in a computer, such as possible copyright infringements, for example.

The editors are to be commended in their continuing successful efforts to bring together well written surveys of representative areas from the broad field of computer science and technology "as an antidote to specialization."

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63[Z].—C. ANDERSEN, *An Introduction to ALGOL* 60, Addison-Wesley, Reading, Mass., 1964, vi + 57 pp., 28 cm., plus foldout ALGOL Syntactical Chart. Price $1.75.

This book is a well organized introduction to ALGOL: it deals progressively with the elements and constructions of the language and with the uses to which it may be put. Instructive examples are placed at strategic points in the text, which is eminently suited to the teaching methods currently in use in American universities.