of parabolic type and their convergence. The discussion is largely related specifically to the heat equation, with extensions to other equations noted. Philip Davis and Philip Rabinowitz survey selected aspects of least-square approximation and give some numerical results. Among the topics considered, necessarily briefly, are basic orthogonalization theory and methods, approximation of functions, solving differential equations, and convergence. Kenneth Shoulders gives a detailed, largely qualitative presentation of microelectronics, including material deposition, micromachining, component interconnection, and electron optics. It is noted that computer-controlled electronic construction processes will be necessary to produce the tiny but complex computing machines of the future. Saul Gass outlines several areas of recent progress in the increasingly important field of linear programming. Topics included are integer linear programming, the multiplex method, gradient method, and computing codes. Robert McNaughton discusses automata, defined rather broadly to include any finite system whose outputs are determined by its inputs. Many types of automata are mentioned, such as Turing machines and less well-known concepts.

The microelectronics chapter is descriptive, the automata chapter is philosophical, and the others are mathematical; all are interesting and well written.

The Quantum Mechanics of Many-Body Systems. By D. J. Thouless. Vol. 11 of Pure and Applied Physics, edited by H. S. W. Massey. 175 pp. Academic Press Inc., New York, 1961. $5.50. *Reviewed by R. W. Hellwarth, Hughes Research Laboratories.*

TO derive from first principles the properties of many-body systems whose behavior can only be understood in terms of quantum mechanics is a large undertaking. It is no surprise that the remarkable, if only partial, successes in understanding many-body systems have come mainly through physical insight gained from experiment and coupled with mathematical ingenuity, rather than from any organized body of theory. Nevertheless, formalisms for the systematic calculation of many-body problems have been developed (spurred perhaps by the successes of quantum-electrodynamic theory) which have served to clarify and unify (and occasionally confuse) many-body problems. In *The Quantum Mechanics of Many-Body Systems*, D. J. Thouless surveys the formalisms and physics of systems of many identical particles, rederiving old and new results and discussing the approximations required by the various methods. The development of each subject is traced from first principles, but with rigor and detail generally sacrificed for clarity. Qualitative and classical results are often rederived to illuminate the implications of the quantum mechanics and establish a physical feeling for the problem. The book therefore serves as an excellent bridge from "elementary" statistical mechanics to the current sophisticated methods of diagram summation, Green's functions, etc. Moreover, Thouless dwells at most length on subjects that have not been treated in review elsewhere, referring the reader to other more complete discussions when duplication would involve lengthy digression. All but a few pages are devoted to systems of many identical fermions, although the alteration of formulae required to treat bosons is indicated in a general way whenever it is convenient. Exposition of the mathematical framework for treating such subjects as low-lying excited states, collective motion, and finite temperature effects is everywhere interspersed with the actual calculation of results for electron gases, superconductivity, nuclear models, etc. It is gratifying to find difficulties, unclear points, and unsolved questions constantly pointed out. The result is a volume which is a clear review of and a useful guide through a fast moving field of considerable theoretical complexity.

Dispersion Relations and the Abstract Approach to Field Theory. Lewis Klein, ed. Vol. 1 of Internat'l Science Review Series. 273 pp. Gordon & Breach, Publishers, Inc., New York, 1961. $4.95. *Reviewed by Freeman J. Dyson, Institute for Advanced Study.*

THIS book is an anthology of recent original papers in the more mathematical and axiomatic parts of quantum field theory. The papers are well chosen, and together they lay out a logical path to be followed by anybody trying to work his way into the voluminous current literature of field-theoretical research. However, the book is spoilt by several serious faults which I will now discuss.

It is natural to compare this book with the "Series of Selected Papers in Physics," a series of volumes published by the Physical Society of Japan for the use of its members. Unfortunately, because of the protectionist policies of the American publishing industry, the Japanese series is not for sale in the United States. The volume under review is very similar to the volume *Theory of Elementary Particles, I*, in the Japanese series. The two collections have five papers in common.

Comparing the American with the Japanese volume, I find the American to be inferior in three major respects. (1) The American book is printed on a smaller page and on fuzzier paper. This makes the text, especially when it is reduced from the large page size of *The Physical Review*, aesthetically unattractive and difficult to read without eye strain. (2) The American publishers include no note of thanks or acknowledgment to the authors and journals from which they have taken their material. They did not in fact ask permission or even notify the authors that a reprinting was intended. The Physical Society of Japan has always been scrupulously courteous in asking and acknowledging such permission. (3) The American editor decided to have translated into English three papers which were originally published in German. The translations are so bad that they make these excellent papers almost unintelligible. The translators evidently know nothing of the