$$\pi(n \cdot 10^6) \quad \text{and} \quad \pi(n \cdot 10^6) - \pi((n-1) \cdot 10^6),$$
$$R(n \cdot 10^6) \quad \text{and} \quad \mathrm{DIF}(n \cdot 10^6),$$

where

$$R(X) = \sum_{m=1}^{\infty} m^{-1}\mu(m) \operatorname{li}(X^{1/m}) \quad \text{and} \quad \mathrm{DIF}(X) = \pi(X) - R(X).$$

Except for rounding differences in $R(X)$, this part of Table A coincides with one-fifth of Mapes' [2] which goes to $n = 1000$. (The two authors are performing very different calculations for their $\pi(n \cdot 10^6)$, since Weintraub counts the actual primes while Mapes is using an elaborate recursive formula.)

Table A continues with the number of twin pairs in these intervals, and cumulatively. These counts agree, where they overlap, with those in [3] and [4]. Table A concludes with the maximal gap in each million—its size and location. Compare [3] and [4].

Which is the first million containing more primes than its predecessor? The thirty-third. Which is the first million with more twins than its predecessor? The eighth.

D. S.

1. Sol Weintraub, *Distribution of Primes between* 10^{14} *and* $10^{14} + 10^8$, UMT 27, *Math. Comp.*, v. 26, 1972, p. 596.
2. David Mapes, UMT 39, *Math. Comp.*, v. 17, 1963, p. 307.
3. D. H. Lehmer, UMT 3, *MTAC*, v. 13, 1959, pp. 56–57.
4. F. Gruenberger & G. Armerding, UMT 73, *Math. Comp.*, v. 19, 1965, pp. 503–505.

39 [13.15].—Norman S. Land, *A Compilation of Nondimensional Numbers*, NASA SP-274, National Aeronautics and Space Administration, Washington, D. C., 1972, 122 pages, softcover. Price $0.70.

All applied mathematicians know of the Mach number, the Reynolds, the Froude. But do you know the Jeffrey, the Jacob, and Jakob, the Hersey, the Hartmann, etc.?

All such technical numbers, together with others not named after investigators, such as "magnetic force number," are listed alphabetically in 97 pages of this booklet in the following format: Name, formula, explanation of symbols, technical field in which it occurs, reference. Usually, there is also a characterization of its nondimensionality as a ratio of like quantities, such as

$$\frac{\text{heat radiated}}{\text{heat conducted}} \quad \text{or} \quad \frac{\text{vibration speed}}{\text{translation speed}}.$$

There are 34 references and a shorter list of books on dimensional analysis, similitude, and units. The five-page index relists these numbers by subject matter; e.g., under *Surface Waves*, one finds the Boussinesq, Froude, Russell, and Weber. *Heat transfer* and others have much longer lists.

Some names mean the same thing: Crocco = Laval; others are related: Cauchy = Mach^2. The reviewer is unfamiliar with most of these numbers and has no comment on the accuracy here. He has been told, for instance, that Ekman should be

$$\frac{\text{viscous force}}{\text{coriolis force}} \text{ not } \frac{\text{viscous force}}{\text{centrifugal force}}.$$

In any case, it appears that this is a useful booklet for those in these fields.

D. S.

40 [13.35].—N. V. FINDLER & B. MELTZER, Editors, *Artificial Intelligence and Heuristic Programming*, American Elsevier Inc., New York, 1971, viii + 327 pp., 24 cm. Price $17.50.

This book consists of a series of papers based on lectures given at the First Advanced Study Institute on Artificial Intelligence and Heuristic Programming, held in Menaggio, Italy, on August 3–15, 1970. The papers cover a wide range of topics in Artificial Intelligence: theorem proving, problem-oriented languages, game playing, problem solving, heuristic search, question-answering systems, natural language analysis, picture processing, and cognitive learning. Five papers are tutorials dealing with well-established results in Artificial Intelligence. These are well-written, pertinent papers which should appeal to nonspecialists who wish to learn more about a particular area of AI. The other eight papers are descriptions of recent research in the field, and, in general, can be readily assimilated by those with a certain minimal background in Artificial Intelligence.

The 13 papers presented in this volume are listed below. The first two are clear, concise tutorials on theorem proving. Robinson's paper focuses on the deduction problem, i.e., determining whether a given assumption A logically implies a given conclusion C, and shows that resolution is an interesting way to attack this problem. The paper by Meltzer discusses the efficiency of automatic proof procedures, particularly with regard to the resolution method of theorem proving. Related issues like completeness and proof complexity are also considered, and guidelines for the design of efficient proof procedures are suggested.

The next two papers are accounts of recent research related to problem-oriented languages. The paper by Elcock describes ABSYS, a language for writing programs in the form of unordered, declarative statements. When these programs consist of sets of problem constraints, their compilation is a problem-solving task, and, thus, the compiler for ABSYS can be considered a problem-solving compiler. Findler's paper provides brief descriptions of seven AI projects that are being programmed in AMPPL-II, an associative memory, parallel processing language imbedded in FORTRAN IV.

The next three papers discuss recent work in problem solving, with emphasis on heuristic search. Sandewall, in his paper, introduces a number of quite useful concepts for defining heuristic methods in a general, compact way. These concepts are then used to describe the SAINT program and the unit preference strategy in resolution. The paper by Michie contains a discussion of graph searching algorithms and their application in the formation of plans by machine. To fully appreciate this interesting paper, one should be moderately familiar with the POP-2 language and Michie's work on memo functions. The paper by Pitrat discusses a language for describing the rules of board games like chess, go-moku, and tic-tac-toe. General