The last two chapters are quite distinct, almost in the nature of an appendix "designed to illustrate one or two interesting points" such as congruences as the sole undefined relation between points, non-euclidean areas, etc.

Mr. Forder has undertaken a difficult task and, while his work may be open to criticisms in some respects, he has made a readable book, the study of which by our teachers of euclidean geometry might go far toward eliminating the inaccuracy of concepts and illogical deductions from the minds of those supposedly engaged in teaching accurate, precise thinking. It is a worth while book which may well serve as a stimulus to others to write into our literature more exact presentations of our basic geometric concepts.

F. W. OWENS

Operational Methods in Mathematical Physics. By Harold Jeffreys. London, Cambridge University Press, 1927. vii+101 pp. Price 6 s. 6 d.

This valuable monograph is number 23 of the important series entitled Cambridge Tracts in Mathematics and Mathematical Physics. The author says in the preface: "My own reason for writing the present work is mainly that I have found Heaviside's methods useful in papers already published, and shall probably do so again soon, and think that an accessible account of them may be equally useful to others." As a matter of fact he has filled admirably a gap of some thirty years standing in the literature pertaining to the solution of the differential equations of physics, since Heaviside's own work is not systematically arranged and in places its meaning is rather obscure. Jeffreys also affirms that " · · · it is certain that in a very large class of cases the operational method will give the answer in a page when ordinary methods take five pages, and also that it gives the correct answer when the ordinary methods, through human fallibility, are liable to give a wrong one."

A general idea of the scope of the text may be derived from the chapter headings, which are in order: Fundamental Notions, Complex Theory, Physical Applications: One Independent Variable, Wave Motion in One Dimension, Conduction of Heat in One Dimension, Problems with Spherical or Cylindrical Symmetry, Dispersion, and Bessel Functions. A wealth of illustrative material is compressed within these main divisions. Thus, for example, the third chapter deals with the following topics: (1) variation with time of the electric charge on the condenser plates for a circuit containing a voltaic cell, a condenser, and a coil possessing inductance and resistance; (2) the Wheatstone bridge method of determining inductance; (3) the seismograph, with special reference to the instruments of Galitzin and Milne-Shaw; (4) resonance for a simple pendulum; (5) motion of three particles attached to a stretched string; (6) radioactive disintegration of uranium; and (7) some dynamical applications.

The monograph will be interesting to mathematicians as well as to physicists because it brings out difficulties which require further investigation. For illustration, the first sentence on page 53 is: "A general proof that the results given by the operational method, when applied to the vibrations of continuous systems, are actually correct, has not yet been constructed." Likewise the comments in section 8.8 are suggestive and illuminating. The volume closes with a note on the notation for the probability integral, with a page on interpretations of the principal operators, with a bibliography of papers in which operational methods are used, and with author and subject indexes.

H. S. UHLER

Nouvelles Tables de Log n! By F.-J. Duarte. Paris, Index Generalis, 1927. xxiv+136 pp.

This book contains in large clear type the common logarithms to 33 decimals of factorial n from $n=1$ to $n=3000$. A preface is given by Professeur M. R. de M. de Ballore, who emphasizes the importance and reliability of the work. The largest previous table by Degen, (1824), contained 18-place logarithms up to log 1200! The aim of Duarte was to allow adequate study of expressions constantly occurring in the theory of probability.

Incidentally the author points out errors in the logarithms of 829, 1087, 1409, 1900 as given by Wolfram and published in Vega's Thesaurus, also in Thoman's values for log 45! and log 55! and Degen's values for log 1093! and log 1180!.

In 1925 Duarte and Ballore published a similar twelve-figure table to $n=1000$.

The present table was constructed by adding successively the logarithms to 39 decimals of numbers from 1 to 3000. To control the table Stirling's formula was used to calculate independently to 36 places log $50k$! for $k=1, 2, \cdots, 60$. The forcing of a digit in the 33d place is indicated by an asterisk.

If p is a prime beyond 1000, its logarithm may be calculated by means of the remarkable series $\log p=\frac{1}{2}\log(p-1)+\frac{1}{2}\log(p+1)+\Delta_0+\Delta_1+2.8\Delta_2+72.4\Delta_3/7+304.48\Delta_4/7+R_4$, where $4p\Delta_0=\log(p+1)-\log(p-1)$, $6p^2\Delta_k=\Delta_{k-1}$, $k=1, 2, 3, \cdots$, and $R_4<.0^{38}5$. The author used a similar series to compute $\log p$ when $17<p<1000$ by a proper choice of m such that $mp-1$ and $mp+1$ contain prime factors less than p. He accordingly started with 42-place logarithms of 2, 3, 5, 7, 11, 13, 17 and calculated all the other primes by this new method.

Three obvious errors in printing occur on pp. xiv, xvi, and xxii.

In calculating a logarithm the method of Flower is used and illustrated by the evaluation of $\log \pi$ and $500!/40!\times 460!$ The necessary table for Mn, $n=1, 2, \cdots, 100$; and the brief table for $\log 1.0^s k$, $s=0, 1, \cdots, 16$; $k=1, 2, \cdots, 9$, constitute Tables II, III, respectively, the former running to 40 decimals.

The reviewer was pleased to find a use for this new table in computing $\log \pi$ from the formula

$$\pi^{35}E_{17}=2^{36}\times 34!(1-1/3^{35}+1/5^{35}-1/7^{35}+\cdots)$$

correct to 33 places.

C. C. CAMP