SHORTER NOTICES

Mathematical Tables. Volume 2. Prepared by the Committee for the Calculation of Mathematical Tables. London, British Association for the Advancement of Science, 1932. viii+34 pp.

The first volume of the British Association Mathematical Tables was described in this Bulletin, vol. 38, pp. 458–462. The second volume is devoted entirely to the tabulation of certain Emden functions. The origin of the work is explained in the preface: "In 1930 Sir Arthur Eddington, as President of the Commission for the Constitution of the Stars of the International Astronomical Union, suggested to the Committee for the Calculation of Mathematical Tables that they should undertake the tabulation of solutions of Emden's equation, which is fundamental in modern theories of the internal structure of the stars. The Committee, which is anxious to establish itself as a clearing-house for tables of this nature, was authorised by the Association to put the necessary work in hand."

Emden's equation may be written

$$\frac{d^2y}{dx^2} + \frac{2}{x}\frac{dy}{dx} + y^n = 0.$$

The solutions here tabulated are those which are regular at $x=0$ and are defined by the initial conditions: $x=0$, $y=1$, $y'=0$. For $n<5$ these solutions all vanish for some finite positive value $x=x_0$, the value of x_0 increasing with that of n, as shown in the following table.

n	x_0	n	x_0	n	x_0
1.0	3.1415927 $(=\pi)$	2.5	5.3552754	4.0	14.9715476
1.5	3.6537537	3.0	6.8968486	4.5	31.8364636
2.0	4.3528746	3.5	9.5358054	5.0	∞

The tables are constructed for the values of n indicated above and, with the exception of $n=3$ and $n=5$, are carried as far as the first root $x=x_0$, the interval for x being usually 0.1. In the case of $n=3$ the table extends to the third root, which is slightly greater than 102. For $n=5$ the table extends as far as $x=5$. In two cases, $n=1$ and $n=5$, the equation admits of integration in terms of simple functions and the tabulation has been abbreviated by the omission of certain auxiliary functions.

In addition to the tabulation of the fundamental solution (y) and of its derivative (y'), higher derivatives have been given to facilitate interpolation by Taylor's theorem, and eight auxiliary functions, required in astronomical calculations, are also tabulated.

The introduction and explanation of the tables was written by Mr. D. H. Sadler of H. M. Nautical Almanac Office. The cost of preparing the tables was borne by the British Association and the cost of printing this volume by the International Astronomical Union.

W. R. LONGLEY