The book closes with two smaller tables: the first consists of 7S values of $\exp(m \cdot 10^{-5}/\sqrt{2})$ for $m = 1(1)1000$; the second gives exact values of $t(1-t)/2$ for $t = 0(.001).500$, for use in interpolation with second differences, which are given throughout the main tables.

We are informed in the Preface that the underlying computations were performed on the electronic computer STRELA, using the well-known power series and asymptotic series for these functions. These details, as well as a discussion of the arrangement of the tables and their use, are presented in the Introduction. It is there stated that the tabular entries are each correct to within 0.6 of a unit in the last place shown.

The reviewer carried out a partial check of the correctness of this statement concerning the accuracy of these tables, by comparing several entries in them with corresponding data in the recent tables of Lowell [1] which give values of the Kelvin functions and their first derivatives for $x = 0(.01)107.50$ to between 9 and 14 significant figures. Comparison of the two tables revealed that the values given by Nosova for functions of the first kind and their derivatives are correct to within a unit in the last place for the range $x = 0(.01)10$. However, in the vicinity of zeros of the functions of the second kind and of their derivatives the Russian tabular values err by as much as 6 to 8 units, as, for example, kei x when $x = 8.24(.01)8.47$ and kei'(x) when $x = 9.38(.01)9.43$. The reviewer has verified, moreover, that ker'x is in error by 9 units when $x = 7.16$ and 7.18, and that ker' 7.17 is too low by 86 units, which is explainable by virtue of the fact that this last tabular entry is only one-tenth its neighbors, and all three are subject to a nearly constant absolute error.

This same difficulty in attaining the stated accuracy occurs in the second table in the book under review. Egregious examples of just a few of the large relative errors that were discovered occur in $e^{x/\sqrt{2}}$ kei x when $x = 97.19$ (tabular value too low by 335 units), in $e^{-x/\sqrt{2}}$ bei x when $x = 98.30$ (too high by 1027 units), and in $e^{x/\sqrt{2}}$ ker x when $x = 99.41$ (too high by 363 units). It should be stated here that the table of $e^{x/\sqrt{2}}$ was also checked at several places, and no errors were found.

The arrangement of the material is very convenient, all functions of a given argument being found on facing pages. It is indeed unfortunate that the attractiveness and convenience of these tables could not have been matched by acceptable accuracy. This accuracy could have been attained throughout by use of computer routines employing double-precision arithmetic, such as were used by Lowell.

J. W. W.

1. HERMAN H. LOWELL, *Tables of the Bessel-Kelvin Functions Ber, Bei, Ker, Kei, and their Derivatives for the Argument Range 0(.01)107.50*, Technical Report R-32, National Aeronautics and Space Administration, Washington, D. C., 1959. See *Math. Comp.* v. 14, 1960, p. 81 (Review 9).

90[H, S, X].—A. L. LOEB, J. TH. G. OVERBEEK & P. H. WIERSEMA, *The Electrical Double Layer Around a Spherical Colloid Particle*, The Technology Press of M.I.T., Cambridge, Mass., 1961, 375 p., 26 cm. Price $10.00.

These tables give the numerical solution of the Poisson-Boltzmann equation

$$r^{-2}\frac{d}{dr}\left(r^2\frac{d\psi}{dr}\right) = -\frac{4\pi e}{\epsilon}\left[n_+ z_+ \exp\left(-\frac{z_+ e\psi}{kT}\right) - n_- z_- \exp\frac{z_- e\psi}{kT}\right]$$

where ψ is the electric potential at radius r from the center of a charged, spherical

colloidal particle in an electrolyte; the local charge distributions and the free energy are also given. The electrolyte is characterized by the following parameters: ϵ, the dielectric constant; z_+, the valence of the positive ions; z_-, the valence of the negative ions; n_+, the concentration of positive ions far from the particle; n_-, the concentration of negative ions far from the particle; T, the absolute temperature.

For the numerical computations reduced variables are introduced. In these new variables the Poisson-Boltzmann equation becomes

$$\frac{d^2y}{dx^2} = \frac{\exp(z_-y) - \exp(-z_+y)}{2z_-x^4}$$

and the boundary conditions are $y = 0$ at $x = 0$ and $y = y_0$ at $x = x_0$, where y is the reduced potential and x is the new independent variable. The local charge distributions and the free energy are represented by $I_+(x)$, $I_-(x)$, and $F(x)$ where:

$$I_+(x) = x^2 \int_0^x \frac{1 - e^{-z_+y}}{2z_-\tau^4}\, d\tau;$$

$$I_-(x) = x^2 \int_0^x \frac{e^{z_-y} - 1}{2z_-\tau^4}\, d\tau;$$

$$F(x) = x^2 \int_0^x \left[\frac{1}{2}\left(\frac{dy}{d\tau}\right)^2 + \frac{z_+(e^{z_-y} - 1) - z_-(1 - e^{-z_+y})}{2z_+z_-^2\tau^4}\right] d\tau.$$

The quantities x, $y(x)$, $I_+(x)$, $I_-(x)$, and $F(x)$ are tabulated for a variety of values of z_+, z_- (1,1; 2,1; 3,1; 1,2; 1,3) and of $1/x_0$ (from 0.1 to 20 in varying steps) and of y_0 (from 0.5 to 16 in varying steps). The values of y, I_+, I_- and F are said to be accurate to four significant figures, except for a few cases where there is an error in the third figure.

The tables include a forty-page discussion of the equation to be solved, the numerical methods and the results.

These computations are said to be more extensive and more accurate than similar computations performed by N. E. Hoskin, *Trans. Faraday Soc.*, v. 49, 1953, p. 147.

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91[H, X].—LOTHAR COLLATZ, *The Numerical Treatment of Differential Equations*, Third Edition, Translated by P. G. Williams from a supplemented version of the second German edition, Springer-Verlag, Berlin, 1960, xv + 568 p., 24 cm. Price DM 98.

The translation of Professor Collatz's book into English will be welcomed by all those people who are in any way concerned with the numerical solution of differential equations. No other single book on this subject contains such a vast amount of material. The following list of the chapter headings gives some idea of the range of topics covered.

I. Mathematical Preliminaries and Some General Principles