Mathematical Association

Review
Author(s): J. B. Dale
Review by: J. B. Dale
Source: *The Mathematical Gazette*, Vol. 8, No. 121 (Jan., 1916), p. 223
Published by: Mathematical Association
Stable URL: http://www.jstor.org/stable/3602728
Accessed: 24-10-2015 01:27 UTC

show how certain logarithms can be calculated, but these we have frankly been quite unable to follow; the remainder are simple calculations, such as $(1\cdot035)^{25}$ and $2^{\frac{1}{3}}$, and direct and inverse questions on interest—common enough to those engaged in actuarial practice, but quite unintelligible to the ordinary mathematical reader without an explanation of the symbols employed. Thus one of the inverse examples is to find i from the equation

$$120 = 2\cdot25 a_{50} + 112\cdot5 v^{50}.$$

The solution is distinctly neat, but would appeal to a wider circle of readers if it were explained that $a_{50} = \frac{1 - v^{50}}{i} = \frac{1-(1+i)^{-50}}{i}$, where i is the rate of interest per unit per period. The examples of direct calculation are far from impressive. Thus, to obtain $(1\cdot035)^{25}$ we find by inspection of the tables that the logarithm of 1·035 lies between 27 and 28, and, using interpolation (necessitating the use of a slide rule or an ordinary logarithm table), that 25 times this logarithm is 688·45 approx. The next process is to take the antilogarithms of 688 and 689 from the tables and interpolate again, and the result is finally obtained correct to 5 figures. The work can be performed in one-tenth of the time by using Chappell's tables. In fact, all the examples given, except those on logarithms to 12 or more places, can be solved very much more rapidly and with sufficient accuracy for all practical purposes by Chappell's tables. S. T. SHOVELTON.

A Course in Fourier's Analysis and Periodogram Analysis for the Mathematical Laboratory. By G. A. CARSE and G. SHEARER. Edinburgh Mathematical Tracts, No. 4. Pp. viii + 66. 3s. 6d. net. 1915. (G. Bell and Sons.)

The first chapter of this tract contains an elementary account of Fourier's series treated from the analytical point of view, while in the second, methods are explained by which the coefficients in a series can be practically evaluated when the relationship between the dependent and independent variables is given in the form of a curve or table. The greater part of the matter in these chapters has already appeared in the Napier Tercentenary volume on "Modern Instruments and Methods of Calculation," but the discussion in the tract is confined to arithmetical and graphical methods. In Fourier Analysis it is assumed that the period of the total fluctuation of the function to be analysed is known, but when this is not the case, we are confronted with a much more difficult problem. There are many natural phenomena, such as the spottedness of the sun, the brightness of variable stars, the magnetic elements of the earth, whose magnitudes exhibit a quasi-periodicity, and it is a matter of great interest to attempt to discover whether these variations can be represented as the sum of a number of simple periodic terms. The case of the tides shows us that, supposing such a mode of representation to be possible, the arguments of the various terms involved may not stand in any simple relation to one another. Lagrange seems to have been the first to consider the problem, and he invented two methods of dealing with it, of which the first appeared in 1772 and the second in 1778. The next step was taken by Schuster, who in 1897 proposed the use of the Periodogram for the purpose of detecting periodicities. This method and a worked example illustrating its application is explained in Chapter III. of the tract. It is certainly an oversight that Schuster's name is not mentioned. In 1914 Dale proposed a method which is fundamentally the same as the second Lagrangian one, and this is also fully explained, and the results obtained by means of it are compared with those obtained by the Periodogram. The agreement is very satisfactory. The amount of computation involved in the application of either method is considerable. It is probable that the Periodogram will prove to be the better method for detecting real periodicities when they are combined with purely fortuitous fluctuations, but in other cases the Lagrange-Dale method will effect the analysis more rapidly. The final chapter deals with Spherical Harmonic Analysis, and contains an account of Bauschinger's development of Neumann's method for calculating the coefficients. It is obvious that the tract is one of great value to students of astronomy and cosmical physics. J. B. DALE.