Tableaux logarithmiques. A et B. By DR. A. GUILLEMIN. Pp. 32 of explanatory matter, with two pockets containing the two tables. Paris, Félix Alcan, 1906. Price, 4 francs complete. 2 francs for separate parts.

Let N be a number whose logarithm is required, and let m be a near number whose logarithm is given in a table. Then if $N=m(1+\alpha)$ the quantity to be added to the known $\log m$ in order to obtain the required $\log N$ is $\log(1+\alpha)$, and is a quantity of the same order of magnitude as α, when α is small.

This property is utilised by Dr. Guillemin to enable logarithms and antilogarithms to be obtained to 6 and 9 decimals respectively by means of his tables A and B, each table containing only 1,000 entries, and the larger table measuring only roughly 1 ft. 6 in. × 1 ft. 3 in. The tables are really tables of antilogarithms rather than of logarithms. The logarithms in the second column (L) are the successive decimal numbers of three figures from 000 to 999; the corresponding antilogarithms in the first column are given to six places in Table A and to nine places in Table B. The third columns give the values of $\log \alpha$ to 3 and 6 places respectively, for which the corresponding values of $\log(1+\alpha)$ are entered in the second columns.

Suppose then I want to find log 3·141593 from Table A to six places. The nearest number in the table is 3140509, of which the logarithm is given as ·497, and these are the first three figures of the required logarithm. The process stands thus:

$$N=3\cdot141593 \qquad \log N=\log m+\log(1+\alpha)$$
$$m=3\cdot140509 \qquad \log m=\cdot497$$

By subtraction

$$N-m=m\alpha=0\cdot001084.$$

I then look for log 0·001084 in the tables and find log 1083927 = ·035, which is the value required for $\log m\alpha$ *to three decimal places.* The work now stands thus:

$$\begin{aligned} \log m\alpha &= \bar{3}\cdot035 \\ \log m &= \phantom{\bar{3}}\cdot497 \text{ (above)}, \\ \therefore\ \log \alpha &= \bar{4}\cdot538. \end{aligned}$$

I then look for $\bar{4}\cdot538$ in the column headed $\log \alpha$ and find it opposite 150 in the column L. This means that the corresponding value of $\log(1+\alpha)$ is ·000150, and adding this to the value of $\log m$ the final result is log 3·141,593 = ·497150.

In the second table (Table B) the antilogarithms are given to 9 decimal places and the values of $\log \alpha$ to 6 decimal places. To obtain logarithms correct to 9 decimal places it might be thought at a first glance that it would only be necessary to repeat twice the operations required with six figure work with Table A. An attempt to do so, however, shows that the method is not so simple as this, but that it is necessary to perform the three operations described by the author in his explanation.

Suppose, for example, it is required to calculate log 5.

The tables give $0{\cdot}698 = \log 4{\cdot}998{,}884{,}875$, so that 0·698 are the first three figures of $\log 5$ with a remainder in the antilogarithm of 0·011,155,125. If we use the $\log a$ method *either* with Table A *or* with Table B there is not much difficulty in obtaining the next three figures 970, but the table does not contain sufficient data to find the final remainder required to give the last three figures. The only way is to use the tables *backwards* in order to obtain the antilogarithm of 0·698,970 correct to 9 decimals. This involves a second use of the tables with the assistance of the $\log a$ column, and leads to the result

$$\log 4{\cdot}999{,}999{,}954 = 0{\cdot}698{,}970.$$

The final remainder is 0·000,000,046, from which a repetition of the first operation gives the last three figures of the logarithm, namely 004.

It will thus be seen that the calculation of logarithms to 9 figures is three times as difficult as their calculation to 6 figures. It involves three distinct operations instead of one, and the author is therefore justified in calling the tables A and B respectively single and triple extension tables. It is not often that logarithms are actually required to 9 places, and the emergency may be provided for by keeping a copy of the tables and learning to work Table B when necessity arises, rather than by keeping a big cumbersome book of tables which is never to be found when it is wanted, and still involves cumbersome work in the matter of interpolation.

It should be pointed out that the class teacher who sends the copies of the explanatory notice to the bookbinder to have the pages cut in order to prevent his pupils from wasting their time, will find the pockets for holding the tables cut off. French people are as a rule mortally afraid of the guillotine, but unless this is used the pages should be made larger than the pockets, which they are not.

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Einführung in die Theorie der Differentialgleichungen mit einer unabhängigen Variabeln. Von DR. LUDWIG SCHLESINGER. (*Sammlung Schubert*, XIII.) (Leipzig, 1904.)

Gewöhnliche Differentialgleichungen beliebiger Ordnung. Von DR. J. HORN. (*Sammlung Schubert*, L.) (Leipzig, 1905.)

The subject of differential equations has grown to such an extent that it is necessary for the writer of a text-book to confine himself to a particular aspect of the subject. The works that we have before us deal with what might be called the formal side of the subject, that is the considerations connected with the existence of solutions, the nature of the integrals in the vicinity of the singularities, and the form of the equations when the singularities are of a specified type.

Dr. Schlesinger's treatise is a good introduction to the higher work on the subject. The writer, aiming at simplicity, considers only equations of the first two orders, a feature which will be welcome to many readers since it enables them to obtain a grip of the essential ideas without having to master any difficult analysis.

It is a significant fact that the differential equations which arise out of problems in geometry and physics are no other than the equations