the equation

$$y'' - \frac{2 \sin x}{\sin x - \cos x} y' + \frac{\sin x + \cos x}{\sin x - \cos x} y = 0,$$

of which the general solution is

$$y = c_1 e^x + c_2 \sin x.$$

Here the coefficients have poles but the general solution is an entire function. Such equations of the second order are readily formed in unlimited number by determining each one so as to have two entire functions as particular integrals, these entire functions being chosen so that their real zeros do not separate each other. This fact is an immediate corollary of Sturm's zero-separation theorem.

R. D. CARMICHAEL.

*Elementi di Aritmetica,* con note storiche e numerose questioni varie per le scuole medie superiori, Parte prima: *Numeri interi—Operazioni, divisibilità, numeri primi.* (Third edition, Trimarchi, Palermo, 1916. vi + 134 pp. Fourth edition, 1918. 132 pp.) By Professor GAETANO FAZZARI, of Palermo. Price, L 1.60.

THIS arithmetic includes, as is common in European texts, much algebraic material. Thus discussion of such topics as the laws of commutation and association, and the euclidean process of finding G.C.D. appear. The fundamental operations of arithmetic are discussed both from the elementary point of view and from that of the higher mathematics.

The Hindu method of "multiplication in one line," by obtaining successively those products which contain units, tens, hundreds, $\cdots$, is explained. Division by use of the complement, frequently a convenient method, is given, illustrated by the division of 47830219 by 68947. The process is as follows, and may be regarded as division by 100000 − 31053.

$$\begin{array}{rl}
 & 31053 \\
47830219 : & 68947 \\
186318\phantom{00} & \overline{\phantom{68947}} \\
\hline
 & 693 \\
6646201 & \\
279477 & \\
\hline
9256789 & \\
93159 & \\
\hline
349948 &
\end{array}$$

Similar devices, more or less illuminating to the young student, are shown in connection with the discussion of all the fundamental operations. A prominent place is given to interesting material in elementary number theory.

For half a century Professor Fazzari has been a distinguished writer on the history of science. This interest is reflected in the well-chosen historical and philological notes which appear at the end of each chapter. The exercises in 31 pages at the end of the work are selected from ancient and modern sources to illustrate curious and interesting properties of numbers.

The fourth edition is, as the preface states, practically unchanged. On its face, this edition is extremely modern, as it is dated "Palermo, 1918" and the author's preface is dated "Palermo, September, 1918.

LOUIS C. KARPINSKI.

*Lehrbuch der darstellenden Geometrie für technische Hochschulen.* By EMIL MÜLLER, professor of mathematics at the technical school of Vienna. Second volume, final instalment. Leipzig, Teubner, 1916. 130–360 pp.; 141–328 figures.

THE first volume of Professor Müller's book was reviewed in the BULLETIN, volume 16, page 136, and the first instalment of the second volume in volume 20, page 258. The present part is concerned with oblique axonometry and central perspective. The former is founded on Polke's theorem, a number of alternate proofs of which are given. As in the preceding parts, the text is well supplied with historical and bibliographical foot-notes, emphasizing that the science was of slow, gradual, and international growth.

The treatment of general axonometric representation is so exhaustive as to make the book hardly suitable as a text, but it is all the more serviceable as a handbook. A full discussion of æsthetic advantages and disadvantages is included, and the method is critically compared with those met with in the earlier parts of the book. Between this subject and central perspective a chapter on oblique projection is inserted, with applications to circles, spheres, and surfaces of revolution. A goodly list of exercises follows each chapter.

The development of the principles of perspective is particularly clear and readable. It is first presented independently, then shown to be approachable also from the $h$, $v$ drawings, or from axonometric ones. The mathematical standpoint