Bernoulli numbers — this includes all odd primes < 100, with the exception of 37, 59, 67. Ten years later he extended this to another series of exponents including these three exceptional numbers, so that the Fermat theorem was proven for all values of $n > 2$ and $\leqq 100$. Kummer received the Paris prize of 1850 for his beautiful work.

In 1909, an award of 1000 Marks was made from the Wolfskehl foundation to G. Wieferich for his proof that Fermat's equation has no solutions all prime to n unless $2^{n-1} \equiv 1 \bmod n^2$. And here the problem rests.

JOSEPH LIPKE.

Solid Geometry. By H. E. SLAUGHT and N. J. LENNES. Allyn and Bacon, Boston, 1911. vi+190 pp.

THIS book follows the plane geometry of the textbook series of the authors. It is divided into seven chapters entitled lines and planes in space, prisms and cylinders, pyramids and cones, regular and similar polyhedrons, the sphere, variable geometric magnitudes, and theory of limits.

The logical phase of the development of solid geometry, as here treated, is a great improvement over that usually found in our textbooks. Many of the more fundamental principles are formally stated as axioms. The first striking example of this is Axiom III: "If two planes have a point in common, then they have at least another point in common." This fundamental theorem of three-dimensional geometry has usually been kept as obscure as possible. In all, ten axioms are thus stated.

A brief treatment of sines, cosines, and tangents, and a few theorems on the projection of lines and of areas are introduced. Some of the theorems on trihedral angles are deferred to the chapter on the sphere, where they are related to the theory of spherical triangles. Euler's theorem is stated without proof, the usual faulty proof being inserted as an exercise in which the error in the proof is to be shown. The definition of polar spherical triangles is made completely. The proof of the theorem that the shortest path between two points on a sphere is the arc of a great circle joining the points is made to depend on the concept of the length of a curve on a sphere as the limit of the sum of the lengths of small arcs of great circles — a somewhat different notion from the limit of the sum of lengths of the chords, which has been previously used in the book for the length of a curve. In the chapter on variable geometric magnitudes, graphs are used to show the relation between volume, surface, and edge of a regular tetrahedron, cube, etc. The final chapter on limits is excellent, and introduces many new ideas not usually presented.

The usual faulty proof of the theorem on the volume of an oblique prism is retained. The minor errors are not numerous, but the following have been noticed: On page 51, line 16, the word cylinder is used where prism is meant. On page 85, line 8 from the bottom, d is used in place of $\frac{1}{2}sd$.

The book is very teachable, and taken altogether is a marked improvement over the usual text.

F. W. OWENS.

First Course in Algebra. By H. E. HAWKES, W. A. LUBY, and F. C. TOUTON. Ginn and Company. vii+334 pp.

THE purpose of the authors as stated in the preface, namely, "to build up a text book thoroughly modern, scientifically exact, teachable and suited to the needs and to the ability of the boy and girl of fourteen," has been in a large measure accomplished. The topics and problems, with a few exceptions which will be noted later, seem to have been chosen with excellent judgment. The idea of reasoning with symbols instead of numbers is introduced gradually but insistently; transposition is explained by means of addition and subtraction and the student is taught the actual use of equations before the term equation is defined at all. The lists of examples in factoring, in linear and quadratic equations, and several other topics, are sufficiently varied and extensive to give the student a thorough drill in elementary mathematical reasoning and manipulation. The authors have made good their intention as stated in the preface to use clear and exact English throughout the book. Typographical errors are few, but we have noted the following: on page 139, line 5, read fraction instead of fractions; replace 3 by $\sqrt{3}$ in the answer to example 1, page 321. We would suggest the use of the word may instead of should in line 7, page 211. The sentence beginning in line 6, page 262, is spoiled somewhat by the presence of the two words graph and figure. It would seem better to use a capital G in the last word on page 263, and similarly in example 18, page 264. One might question the value of asking in example 21, page 322, for a proof that the product of conjugate imaginary numbers is real, after conjugates have been defined on the preceding page