The following typographical errors have been noted:

P. 8, l. 4	for	NP	read	NP_2
P. 14, l. 23	“	ON	“	OM
P. 21, first eq. (18)	“	b_2	“	b_1
P. 28, l. 5	“	D^2	“	D_2
P. 63, last line	“	$a^2\left(1-\frac{2}{c^2}\right)$	“	$a^2\left(1-\frac{k^2}{c^2}\right)$
P. 64, eq. at bottom	“	y	“	z
P. 71, l. 4	“	section	“	sections
P. 72, § 64, eq. 2	“	y^2/a^2	“	y^2/b^2
P. 77, eq. (9)	interchange f and g			
P. 84, l. 17, second term	for	κ	read	κ^2
P. 85, last eq.	“	f, g, h	“	h, f, g
P. 92, l. 4	“	(5)	“	(6)
P. 97, l. 17	“	y^3	“	y^2
P. 101, mid. page	“	$a\sqrt{}$	“	$\pm a\sqrt{}$
P. 102, l. 5	“	$c\sqrt{}$	“	$\pm c\sqrt{}$
P. 103, l. 9	“	hyperbolic	“	parabolic
P. 115, l. 15	“	$x)$	“	(x)
P. 132, l. 2	“	$A(xz)$	“	$A(xy)$
P. 169, l. 2 (bottom)	“	substantiated	“	substituted
P. 177, l. 8	“	poin	“	point
P. 200, l. 17	“	conic	“	conics
P. 243, l. 9	“	cubic	“	quartic

R. M. WINGER.

Elementary Mathematical Analysis, a text-book for first year college students. By CHARLES S. SLICHTER, Professor of Applied Mathematics, University of Wisconsin. New York, McGraw-Hill Book Company, 1914. Price $2.50. xiv + 490 pp.

IN the older texts on pure mathematics the intellectual interest of the student in the subject was assumed, and the practical interest in applications was not given recognition. In many modern discussions of the place of mathematics in instruction the possibility of an intellectual interest in the subject, the possibility that a real need of reasoning, intelligent beings is satisfied by pure mathematics is denied and only that which ministers quite directly to the physical being is recognized. The present text, while it gives some attention to the intellectual side, places the real stress upon the applications to practical affairs, apparently justifying the study of mathematics because of its service to other sciences and to business.

Trigonometry, analytical geometry, and calculus have undoubtedly been made the fundamental mathematical studies in college curricula because of the usefulness of these subjects in the sciences as well as because they are indispensable for further study in mathematics. However, like geometry and algebra in the high-school courses, these subjects have also been taught because they lend themselves to systematic and logical treatment. In analytical geometry, for example, we expect to find the fairly complete discussion of the general equation of the first degree and the similar discussion of the general equation of the second degree. The circle has commonly received analytical treatment because this procedure throws light upon the similar treatment of the other conic sections, enabling the student to comprehend easily the geometrical properties of the other conics as obtained by analytical methods. Entirely aside from the possibility of application to practical affairs the feeling has been that the student obtains, by these methods, some real appreciation of mathematics, of number, and of form. Further than this, even of those who have desired the study of trigonometry, analytical geometry, and calculus because of their applicability to science, many have felt that by the study of the elements of these subjects, without the complications introduced by physical data, the student would be able the better to handle these tools when confronted with a real problem.

Historically the study of the properties of the conic sections by the Greeks was entirely independent of mundane purposes. Yet this study did make possible the achievements of Kepler and Newton; these Greek studies prepared the way for the development of modern mathematics.

In this text the reader will look in vain for any systematic discussion of the straight line and the general equation of the first degree. The formulas for the distance between two points, for the area of a triangle formed by three points, and for the point of division of the line joining two points do not appear at all. The "point-slope" and the "two-point" formulas for the straight line appear towards the end of the work (pages 431–432). The circle and the conic sections are treated after curves of the form $y = ax^n$. While the general equation of the second degree receives consideration, this seems to be, according to a footnote, in some measure as a concession to correspondence courses. Tangents and normals receive scanty treatment.

The table of contents shows an entirely different order of procedure from that to which we have grown accustomed. The chapter headings are as follows: I. Variables and functions of variables. II. Rectangular coordinates and the power function. III. The circle and the circle functions. IV. The ellipse and hyperbola. V. Single and simultaneous equations. VI. Permutations, combinations, the binomial theorem. VII. Progressions. VIII. The logarithmic and exponential functions. IX. Trigonometric equations and the solution of triangles. X. Waves. XI. Complex numbers. XII. Loci. XIII. The conic sections. XIV. Appendix—a review of secondary school algebra.

An immense amount of material is included within the book; the treatment of this material is not characterized by simplicity. In both of these respects the work is in striking contrast with modern high-school texts on algebra and geometry. Here the tendency has been to simplify by exclusion and to adapt the material presented in every way to the pupil. Any attempt to treat the freshman in college as a superior order of being, as compared with the high-school student, would seem to be doomed to failure.

While the attempt to introduce into the freshman course in mathematics some practical applications of the mathematical material is highly to be commended, to make the entire course center on the discussion of the highly technical is little short of ridiculous. Take as illustration the chapter on "Waves," which is not preceded by any discussion of the parabola and by only the briefest treatment of the ellipse and hyperbola. In this chapter we have extensive and intensive, for the freshman, study of simple harmonic motion, besides stationary waves with a number of problems about "seiches," compound harmonic motion, harmonic analysis, sinusoidal function, and connecting rod motion. What wonderful freshmen! Nothing that has ever been given anywhere to freshmen students of mathematics could be more impractical for the freshman than this material. Similarly, too, topics like the discharge of water over trapezoidal weirs, the capacity of smooth concrete flumes, the flow of water in clean cast-iron pipes have no place in freshman mathematics; fortunate is the engineering school whose seniors are able to discuss intelligently such problems.

The teacher of elementary college mathematics will find some valuable suggestions such as the "Illustrations from Science" (pages 65–71), the use of logarithmic paper, and the proper treatment of physical data.

Typographical errors are numerous. Among other errors "the trajectory of the projectile of a German army bullet" (page 396) is particularly offensive. The statement (page 214) that the principle of logarithms "had been quite overlooked by mathematicians for many generations" is not correct, for the principle was known even to Archimedes and appeared and was discussed in books of the sixteenth century. The development of negative, fractional, and irrational numbers (page 355) is the logical one, and not from "the history of algebra." In the treatment of trigonometry the constant use of all six trigonometric functions would seem to be open to criticism. There appears also repeated emphasis upon rather trivial schemes for memorizing formulas and even the signs of ordinate and abscissa (or of sin α, cos α, and tan α).

Doubtless in the customary instruction in freshman mathematics too little attention has been paid to the functions $y = ax^n$, $y = a \sin mx$, and $y = k \cdot a^x$, and to the elementary applications of these functions and of the conic sections. Possibly in the future some way will be found to include in the freshman course, while preserving a logical treatment of the mathematical material, some applications which will be practical from the standpoint of the freshman. The present text does not appear to be successful either in logical treatment or in the presentation of practical material adapted to first-year students.

LOUIS C. KARPINSKI.

An Introduction to the Theory of Automorphic Functions. By LESTER R. FORD, M.A. (Harv.) G. Bell and Sons, Limited, London, 1915. viii+96 pp. Price 3s. 6d.

THIS is No. 6 of the Edinburgh Mathematical Tracts and has its origin in a series of lectures on automorphic functions given by Mr. Ford to the Mathematical Research Class of the University of Edinburgh during the spring term of 1915.

Mr. Ford has endeavored to bring out "the concepts and theorems on which the theory is formed, and to describe in less detail certain of its important developments." The tract is therefore conceived in the nature of an orientation rather than that of a treatise, and contains six chapters: I, Linear transformations; II, Groups of linear transforma-