MEMOIRS ON INFINITE SERIES.

Memoirs on Infinite Series. Published by the Tokio Mathematical and Physical Society. Tokio, Japan, 1891. 253 pp.

THIS work occupies quite a unique place among translations, and deserves a brief mention in the pages of the BULLETIN. The scope of the book is fully indicated by the table of contents, as follows:

LEJEUNE-DIRICHLET.—On the convergency of the trigonometrical series which serves to represent an arbitrary function between given limits. (Translated from French into English by R. Fujisawa.)

LEJEUNE-DIRICHLET.—On the series whose general term involves two angles and which serves to represent an arbitrary function between given limits. (Translated from French into English by R. Fujisawa.)

ABEL.—Researches on the series

$$1 + \frac{m}{1}x + \frac{m(m-1)}{1 \cdot 2}x^2 + \frac{m(m-1)(m-2)}{1 \cdot 2 \cdot 3}x^3 + \cdots$$

(Translated from French into English by K. Miwa.)

GAUSS.—General examination of the infinite series

$$1 + \frac{\alpha\beta}{1 \cdot \gamma}x + \frac{\alpha(\alpha+1)\beta(\beta+1)}{1 \cdot 2 \cdot \gamma(\gamma+1)}x^2 + \frac{\alpha(\alpha+1)(\alpha+2)\beta(\beta+1)(\beta+2)}{1 \cdot 2 \cdot 3 \cdot \gamma(\gamma+1)(\gamma+2)}x^3 + \cdots$$

(Translated from Latin into English by D. Kikuchi.)

KUMMER.—On the hypergeometric series

$$1 + \frac{\alpha\beta}{1 \cdot \gamma}x + \frac{\alpha(\alpha+1)\beta(\beta+1)}{1 \cdot 2 \cdot \gamma(\gamma+1)}x^2 + \frac{\alpha(\alpha+1)(\alpha+2)\beta(\beta+1)(\beta+2)}{1 \cdot 2 \cdot 3 \cdot \gamma(\gamma+1)(\gamma+2)}x^3 + \cdots$$

(Translated from German into English by H. Nagaoka.)

All the above papers are from *Crelle's Journal* except the fourth, which is from Gauss's Gesammelte Werke. Of the papers themselves nothing need here be said. They are all classical works of the first importance, and are familiar to every mathematician who has a reading knowledge of French,

German, and Latin; but they are now for the first time rendered accessible to English and American students who are not familiar with these languages. I have compared these translations with the original texts, and have found them literal and accurate. Our Japanese co-laborers deserve the thanks of every English-speaking mathematician for the preparation and publication of this important translation.

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CORRECTION OF AN ERROR IN SALMON'S "GEOMETRY OF THREE DIMENSIONS."

THE general accuracy of Dr. Salmon's mathematical books seems to make it desirable to call attention to an error in the fourth edition of his *Geometry of Three Dimensions*. The statement "There is one pinch-point on the conic and two on the line," page 521, lines 1 and 2, should read, "There is one pinch-point on the line and two on the conic."

This interchange of "line" and "conic" may be purely a typographical error, but it has gone into Fiedler's German translation uncorrected, and is liable to cause confusion and difficulty of geometric conception.

The variety of the quartic scroll there considered (Salmon's Case IX, Cayley's Species XI, Cremona's Species IV) is the surface generated by two projectively related sheaves of planes of the second order, which are so situated as to determine a line congruence of the first order and the second class. One pair of corresponding planes of these sheaves intersect in the singular line of the congruence, so that this line is a generator and at the same time a director line of the surface. The plane of the singular conic of the congruence is excluded from the generating sheaves.

The more general surface, Salmon's Case VIII, has two pinch-points on the director conic and two on the director straight line. If the two pinch-points on the straight line coincide, while those on the conic remain distinct, either real or imaginary, we have Case IX; but if the two pinch-points on the conic coincide, the generating sheaves include the plane of the conic as a self-corresponding plane, and the surface degenerates into a ruled surface of the third order and the plane of its director conic.

These special cases were more fully discussed in my paper "On certain ruled surfaces of the fourth order," in the *American Journal of Mathematics*, volume 15.

THOMAS F. HOLGATE.

NORTHWESTERN UNIVERSITY, *April* 28, 1894.