

*T* can be replaced by three transformations which are one-to-one and analytic both ways, combined with one transformation of the form

$$x = u, \quad y = v^2.$$

THEOREM XI. *If the transformation T has the form*

$$x = f(u, v) \equiv c_{20}u^2 + c_{11}uv + c_{02}v^2 + c_{30}u^3 + \dots,$$

$$y = \varphi(u, v) \equiv d_{20}u^2 + d_{11}uv + d_{02}v^2 + d_{30}u^3 + \dots,$$

where the terms quadratic in *u* and *v* are not identically zero for either *f* or  $\varphi$ , and where these quadratic terms have no common factor, then there exists a four-valued continuous inverse, defined throughout the complete neighborhood of  $x = 0, y = 0$ . This inverse is analytic, with four distinct determinations, except along a complex one-dimensional locus, where it is continuous and less than four-valued. Finally,  $u = 0, v = 0$  when  $x = 0, y = 0$ .

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#### DARWIN'S SCIENTIFIC PAPERS.

*Scientific Papers.* By SIR GEORGE HOWARD DARWIN, K.C.B., F.R.S., Plumian Professor in the University of Cambridge. Vol. III, Figures of Equilibrium of Rotating Liquid and Geophysical Investigations, xv + 527 pp.; Vol. IV, Periodic Orbits and Miscellaneous Papers, xviii + 592 pp. Cambridge University Press, 1910, 1911. Royal 8vo.

THE first two volumes of Sir George Darwin's researches have already been reviewed in the columns of the BULLETIN.\* They contained papers on the practical and theoretical tidal problems which the oceans present and his earlier attacks on the past history of the earth-moon system. The third and fourth volumes contain his investigations on the relations of fluid masses in rotation about an axis under gravitational forces, on the periodic orbits which a particle can describe when attracted by two bodies of finite masses moving in circular orbits about one another, and a number of papers on other matters.

Of the forms which a single mass of fluid can take when revolving without relative motion about an axis under its own gravitational attraction only, two have long been known. Maclaurin's ellipsoid is one of revolution about the axis of rotation and its eccentricity will have a value which depends

\* Vol. 16, pp. 73-78.