Moreover, if $\psi(x, y)$ is the most general function satisfying all of these conditions, we can put $\psi(x, y) = f(x, y) - f(y, x)$ without loss of generality. A brief discussion of such questions is given in section III of the paper cited. Hence from the identity for $f(x, y)$, we infer at once that

$$\Sigma d_3[\psi(d_1 + d_3, d_1 + d_2) + \psi(d_1 - d_3, d_1 + d_2)] \\ = \Sigma d_3[\psi(d_1 + d_3, d_1 - d_2) + \psi(d_1 - d_3, d_1 - d_2)],$$

and this is the formula (Q) of Liouville.

The 39 forms of the addition theorems given by Jacobi in section 18 of the *Fundamenta Nova* imply a multitude of such consequences, many of which are of arithmetic interest.

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SHORTER NOTICES

General Theory of Polyconic Projections. By Oscar S. Adams. Washington, United States Coast and Geodetic Survey, 1919. Special Publication No. 57. 174 pp.

There are many ways of representing, or projecting, the surface of the earth, or parts of it, upon a plane. Any system of lines may be chosen to represent the parallels of latitude, and a second system to represent the meridians. The book before us is designed to give a full account of the so-called polyconic projection, that is the projection in which parallels of latitude are represented by arcs of a non-concentric system of circles with collinear centers. The line of centers is usually, but not necessarily, taken for the central, or principal, meridian. The mathematical problem consists in setting up the equations for the meridians under various hypotheses, methods for constructing the meridians, spacing the parallels, determining the magnification, and so forth. These details the author has worked out for various cases, deriving the formulas for the ellipsoid as well as for the sphere.

Stereographic projection is one type of polyconic projection.