which, by (16), may be written in the form

$$\sum_{\rho=0}^{k}(-1)^{\rho}\binom{\rho}{k}x^{\rho}\,\Gamma_{n+k-\rho}, \tag{23}$$

and hence is expressible in terms of the Γ_n directly.

These results would be useful in determining the systems of Appell polynomials generated by a general doubly periodic function of the second kind.

THE UNIVERSITY OF NEBRASKA

ON DOUBLE RIEMANN-STIELTJES INTEGRALS*

BY J. A. CLARKSON

1. *Introduction.* A recent study by Clarkson and Adams† of functions $f(x, y)$ of bounded variation naturally leads one to the consideration of double Stieltjes integrals. The present paper is devoted to the discussion of certain questions concerning such integrals.

Stieltjes defined the symbol

$$\int_a^b f(x)d\phi(x) \tag{1}$$

by means of the sum

$$\sum_{i=1}^{n} f(\xi_i)[\phi(x_i) - \phi(x_{i-1})],$$

$$(a = x_0 < x_1 < x_2 < \cdots < x_n = b,\ x_{i-1} \leqq \xi_i \leqq x_i).$$

If this sum approaches a finite limit when the norm of the subdivisions approaches zero, (1) is defined as this limit; otherwise (1) is not defined. He showed that for a given $\phi(x)$, a sufficient condition that (1) should exist for every continuous function

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† J. A. Clarkson and C. R. Adams, *On definitions of bounded variation for functions of two variables*, Transactions of this Society, vol. 35 (1933), pp. 824–854.