evaluated for $w=0$; *in* (30) *we make special conventions of the same type as those made in connection with* (13).

In connection with Theorem 4, it is of interest to note the unexpanded forms corresponding to (20), namely,

$$Y_{\infty j} = \sum_{v=1}^{j} z^{-a_v} \frac{(j-1)!}{(j-v)!}\left[\frac{\partial^{j-v}}{\partial w^{j-v}} z^{-w} F_v(w, z)\right]_{w=0}, \qquad j = 1, 2, \cdots, s. \tag{31}$$

THE COLLEGE OF ST. FRANCIS

ON THE FIRST CASE OF FERMAT'S LAST THEOREM*

BARKLEY ROSSER

We prove the following theorem:

THEOREM. *If p is an odd prime, α, β, and γ are integers in the field of the pth roots of unity, $\alpha\beta\gamma$ is prime to p, and*

$$\alpha^p + \beta^p + \gamma^p = 0,$$

then $p \geqq 8{,}332{,}403$.

As ordinary integers are integers in the field of the pth roots of unity, we infer the following:

COROLLARY. *The equation*

$$x^p + y^p + z^p = 0$$

has no solution in integers prime to p if p is an odd prime less than 8,332,403.

To abbreviate statements, we shall say that an odd prime p is improper if there are integers α, β, and γ in the field of the pth roots of unity such that $\alpha\beta\gamma$ is prime to p and

$$\alpha^p + \beta^p + \gamma^p = 0.$$

Then the theorem to be proved can be stated in the form:

THEOREM. *There are no improper odd primes less than* 8,332,403.

The proof is based on a theorem of Morishima† which, in our

* Presented to the Society, February 25, 1939.

† Taro Morishima, *Über die Fermatsche Vermutung*, Japanese Journal of Mathematics, vol. 11 (1935), pp. 241–252. Earlier results of a similar nature are due to Pollaczek, Frobenius, Vandiver, Mirimanoff, and Wieferich. Compare Dickson's *History of the Theory of Numbers*.