On Wendt's Determinant and Sophie Germain's Theorem

David Ford
Vijay Jha

Abstract

After a brief review of partial results regarding Case I of Fermat's Last Theorem, we discuss the relationship between the number of points on Fermat's curve modulo a prime and the resultant R_n of the polynomials $X^n - 1$ and $(-1 - X)^n - 1$, called Wendt's determinant. The investigation of a conjecture about essential prime factors of R_n (Conjecture ??) leads to a proof that Case I of Fermat's Last Theorem holds for any prime exponent $p > 2$ such that $np + 1$ is prime for some integer $n \leq 500$ not divisible by 3.

EDITOR'S NOTE: In addition to providing insight into Wendt's determinant, an object of interest in its own right, this paper belongs to a continuing line of investigations that may prove fruitful in spite of the recent announcement by Wiles of his proof of Fermat's Last Theorem. It is not unreasonable to hope for a more elementary proof than Wiles'.