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Nathan Kaplan* (nathank@princeton.edu), 933 President Street, Brooklyn, NY 11215.

Cyclotomic Polynomials of Order Three and Maximal Height of Divisors of $x^n - 1$.

The n th cyclotomic polynomial, Φ_n , is the monic polynomial whose roots are the primitive n th roots of unity. The problem of determining the maximum size of coefficients of cyclotomic polynomials has been studied extensively. We say that a cyclotomic polynomial has order three if n is the product of three distinct primes, $p < q < r$. Let $A(n)$ be the largest absolute value of a coefficient of Φ_n . We will discuss some new results concerning the function $A(pqr)$. For each pair of primes $p < q$, we will give an infinite family of r such that $A(pqr) = 1$. We will also discuss the periodicity of $A(pqr)$. We will then discuss the problem of determining the maximal coefficient of any integral polynomial dividing $x^n - 1$. We will give a new bound for the maximal height of a divisor of $x^n - 1$ for general n . We will then give more explicit results when n is equal to p^2q , pq^2 , or pqr . (Received September 08, 2006)