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John C. Miller* (jcmiller@math.rutgers.edu), Department of Mathematics, Rutgers University, Hill Center for the Mathematical Sciences, 110 Frelinghuysen Road, Piscataway, NJ 08854-8019. *Computing class numbers beyond Odlyzko's bounds: Real cyclotomic fields.*

Surprisingly, the class number of cyclotomic fields has only been determined for fields of rather small conductor, due to the difficulty of finding the “plus part” of the class number, i.e. the class number of the maximal real subfield. For example, prior to our recent work, the class number of the real cyclotomic fields of prime conductor had only been determined for primes up to 67 (or up to 163 if the GRH is assumed).

The main difficulties presented by these fields of larger conductor are that their Minkowski bounds are quite large, and their root discriminants are too large for the class number to be treated by Odlyzko's discriminant bounds.

Our recent results have improved the situation. We have unconditionally proved that the class number of the real cyclotomic fields of prime conductor is 1 for primes up to 151. Furthermore, under the assumption of the GRH, we have calculated the class number of real cyclotomic fields up to prime conductor of 241.

This new technique should be applicable to any number field of moderately large discriminant, allowing us to confront the problem of determining the class number for a large class of number fields which so far have not been treatable by previously known methods. (Received September 08, 2013)