

## Algorithms for finding class numbers of cyclotomic fields

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Let  $h(k)$  denote the class number of  $\mathbf{Q}(\zeta_k)$ , and  $h^+(k)$  the class number of the corresponding maximal totally real subfield. This talk will consider the algorithmic problems involved in computing the power of a prime  $p$  dividing  $h(p^n)$ , and computing (or approximating) the class number  $h^+(p^n)$ . Past, current, and projected future computations will be described and heuristics for what might reasonably be expected will be considered. The results touch on the Kummer/Vandiver conjecture, the behavior of the Iwasawa  $\lambda$  invariants, the extent to which Cohen-Lenstra heuristics are applicable, and interesting theoretical and practical algorithmic issues.