Constructing Number Fields with Ideal Class Groups of Large Rank

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007 Kemeny Hall, 4:00 pm
(Tea 3:30 pm 300 Kemeny Hall)

Abstract

In 1922, Nagell proved that for any integer m, there exist infinitely many imaginary quadratic number fields with class number divisible by m. Over a half-century later, in 1984, Azuhata and Ichimura generalized Nagell's result to number fields of arbitrary degree. More generally, they proved, for any integers $m, n > 1$, the existence of infinitely many number fields of degree n with ideal class group of m-rank at least $[n/2]$ (Nakano later improved this to $[n/2] + 1$). Recently, progress has also been made on enumerating the number fields in such results. Using an apparently new technique, we improve on the Azuhata-Ichimura-Nakano result and others, including enumerative results. Our technique relies on the Hilbert Irreducibility Theorem and finding certain curves whose Jacobians have a large rational torsion subgroup. The material will be presented in a fairly elementary, accessible manner (for example, largely avoiding any discussion of Jacobians).

This talk should be accessible to graduate students.