Algebra Seminar

Counting Elliptic Curves Over Number Fields

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Abstract: Let E be an elliptic curve over a number field K. The Mordell–Weil Theorem states that the set of rational points $E(K)$ of E forms a finitely generated abelian group. In particular, we may write $E(K) = E(K)_{tors} \oplus \mathbb{Z}^r$, where $E(K)_{tors}$ is a finite torsion group, called the torsion subgroup of E, and r is a non-negative integer, called the rank of E. In this talk I will discuss some results regarding how frequently elliptic curves with a prescribed torsion subgroup occur, and how one can bound the average analytic rank of elliptic curves over number fields. One of the main ideas behind these results is to use methods from Diophantine geometry to count points of bounded height on modular curves.

Tuesday, September 27, 2022, 4:00 pm
Mathematics and Science Center: MSC N304

Mathematics
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