
Undecidability and definability results in number theory

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I will overview two recent joint works with Peter Koymans where we introduced a new method to construct curves with positive but constrained rank. The main new insight is to combine explicit polynomial constructions with additive combinatorics in order to simultaneously have positive but controlled rank. This method opens the possibility to unconditionally use elliptic curves to transfer undecidability results among various rings. In particular this work settles Hilbert 10th problem for any finitely generated infinite commutative ring. And settles a folklore conjecture on the existence of elliptic curves of rank 1 over general number fields.
