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Elliptic divisibility sequences and elliptic nets in computation

Evaluate the sequence of division polynomials at a fixed point on a fixed elliptic curve, and one obtains an elliptic divisibility sequence. These can be generalised to higher rank "elliptic nets" associated to an elliptic curve and an n-tuple of points. In fact, the collection of elliptic nets is in bijection with the collection of tuples $(E, P_1, \ldots, P_n)$ where E is an elliptic curve and the P_i are points on the curve. Taking elliptic nets as an alternate model of elliptic curves, we can see some of the usual quantities associated to a curve arising directly from the net. For example, we can compute Weil and Tate pairings, reduction modulo p (including information about bad reduction), the canonical height, etc. We will also see some problems for elliptic nets which are equivalent to the elliptic curve discrete logarithm problem (this portion is joint work with Kristin Lauter).