RANK COMPUTATIONS FOR THE CONGRUENT NUMBER ELLIPTIC CURVES

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ABSTRACT. In a companion paper, Rubin and Silverberg relate the question of unboundedness of rank in families of quadratic twists of elliptic curves to the convergence or divergence of certain series. Here we give a computational application of their ideas on counting the rational points in such families; namely, to find curves of high rank in families of quadratic twists. We also observe that the algorithm seems to find as many curves of positive even rank as it does curves of odd rank. Results are given in the case of the congruent number elliptic curves, which are the quadratic twists of the curve $y^2 = x^3 - x$; for this family, the highest rank found is 6.