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Integral points on Mordell's curves

Let $k \neq 0$ be an integer. The elliptic curve $y^2 = x^3 + k$ is known as the Mordell curve. A well known theorem by Mordell states that for a given $k \neq 0$, the equation $y^2 = x^3 + k$ has only finitely many integral solutions. We will follow Mordell (1965) giving an algorithmic approach to find all solutions for small values of k. The idea is to apply the theory of binary cubic forms and classical invariant theory. Then we will talk about the results on the number of integral points on Mordell curves with $|k| < 10^7$, based on the algorithm we implemented on Magma.