Elliptic curves with good reduction away from 2 over $Q(\sqrt{5})$ (abstract)

Richard G.E. Pinch

2 Eldon Road, Cheltenham, Glos GL52 6TU, U.K. rgep@chalcedon.demon.co.uk

In this paper we list the elliptic curves defined over $\mathbb{Q}(\sqrt{5})$ with good reduction away from 2. We use the results of the previous papers [2] and [3], referred to as I and II respectively. By Theorem 1.14 of I, such a curve must have a point of order 2 defined over $\mathbb{Q}(\sqrt{5})$ and by Theorem 2.3 of II, if $t \in \mathbb{Q}(\sqrt{5})$ is the corresponding value of the Hauptmodul on $X_0(2)$ then either t or $t' = 4096/t$ satisfies one of the equations

$$t = 64u/v, \qquad u + v = x^2 \tag{1}$$

or

$$t = 64v/2^a u, \qquad 2^a u + v = x^2 \tag{2}$$

where u, v are units, $x \in \mathbb{Q}(\sqrt{5})$ and $a \geq 0$. We solve these equations and determine the corresponding j-invariants and obtain a global minimal equation in each isomorphism class by Tate's algorithm [5]. There are 368 isomorphism classes of these curves.

References

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