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Elliptic curves over quadratic fields with fixed torsion subgroup and positive rank


Abstract. For each of the torsion groups \(\mathbb{Z}/2\mathbb{Z} \oplus \mathbb{Z}/10\mathbb{Z}, \mathbb{Z}/2\mathbb{Z} \oplus \mathbb{Z}/12\mathbb{Z}, \mathbb{Z}/15\mathbb{Z}\) we find the quadratic field with the smallest absolute value of its discriminant such that there exists an elliptic curve with that torsion and positive rank. For the torsion groups \(\mathbb{Z}/11\mathbb{Z}, \mathbb{Z}/14\mathbb{Z}\) we solve the analogous problem after assuming the Parity conjecture.