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Lifting the j -Invariant and Computations with Witt Vectors

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If j_0 is the j -invariant of an ordinary elliptic curve over a perfect field of characteristic $p > 0$, then the j -invariant of its canonical lifting is given by a Witt vector $(j_0, J_1(j_0), J_2(j_0), \dots)$, where J_i is a function on j_0 . Mazur and Tate posed questions about the nature of these coordinate functions J_i . To obtain concrete examples, it is necessary to work with Witt vectors, but arithmetic operations of Witt vectors demand a large amount of computer power. In this talk, we will describe more efficient ways to perform computations with Witt vectors and give some results and data on the questions of Mazur and Tate.