Exercises for Part 2, Section 1.5:
The Torsion Subgroup

Math 582e, Winter 2009, University of Washington

Due Wednesday March 11, 2009

1. Find an example of an elliptic curve E with

$$\#E(\mathbb{Q})_{\text{tor}} < \gcd\{\#E(\mathbb{F}_p) : p \nmid 2N\}.$$

2. Sketch the steps of the Nagell-Lutz algorithm to compute $E(\mathbb{Q})_{\text{tor}}$ for the curve given by the equation $y^2 + y = x^3 - x^2$.

3. Sketch the steps of the reduction mod p algorithm to compute $E(\mathbb{Q})_{\text{tor}}$ for the curve given by the equation $y^2 + y = x^3 - x^2$.