

## HOMEWORK 6

**This problem set is due March 23rd.**

**Reading** For Friday read 2.4 and 2.5

**Problem 1** For each curve below, determine if the given point has finite order and, if it does, calculate its order. Rather than calculating  $P, 2P, 3P, \dots$ , find  $P, 2P, 4P, 8P$  by using the doubling formula on p. 31.

- $y^2 = z^3 - 43x + 166, P = (3, 8)$ .
- $y^2 = x^3 + 17, P = (-2, 3)$

**Problem 2** Prove the strong Nagell-Lutz:

- Do 2.1(b).
- What is the minimum number of rational points of finite order that a nonsingular cubic curve in Weierstrass form can have (remember to count  $\mathcal{O}$ )? Find choices of  $a, b, c \in \mathbb{Z}$  so that  $y^2 = f(x)$  has this minimal number of them.

**Problem 3** Do 2.2(b).