

# MATH 350 ASSIGNMENT 8, FALL 2015

Due in class on Friday, November 6th

Read Chapters 24–25

Part 1. From the textbook *A friendly introduction to number theory*.

- Exercise 24.2, 24.4 (a)
- Exercise 25.2 (a), (b)

Part 2. Extra credit problem

Let  $n$  be a non-zero integer. An element  $a \bmod n$  of  $(\mathbb{Z}/n\mathbb{Z})^\times$  is said to be a *generator* of  $(\mathbb{Z}/n\mathbb{Z})^\times$  if every element of  $(\mathbb{Z}/n\mathbb{Z})^\times$  is a power of  $a \bmod n$ . [When  $n$  is a prime number, this notion is the same as that of a primitive element.]

- (a) For each of the following cases  $n = 5, 7, 8, 9, 15, 16, 21, 25, 27$ , determine whether  $(\mathbb{Z}/n\mathbb{Z})^\times$  has a generator.
- (b) Formulate a plausible statement about whether  $(\mathbb{Z}/n\mathbb{Z})^\times$  has a generator, for general positive integer  $n \geq 3$ .