

Math 255 - Spring 2017
Review Homework

This homework is not for credit and should not be turned in. The solutions will be posted on Monday May 8.

These problems are from the course textbook, Burton's *Elementary Number Theory*, 7th edition.

Section 2.2: # 2

Section 2.4: # 1, 2

Section 2.5: # 1, 2

Section 3.1: # 5b)

Section 4.4: # 1, 4

Section 6.1: # 19, 20

Section 7.2: # 1, 4a)b)

Section 8.1: # 1

Section 8.4: # 1 (the primitive roots of 13 are 2, 6, 7 and 11), 3

Extra problems

1. Is 113 prime? (Hint: $\sqrt{113} \approx 10.6301$)
2. Solve the following system of congruences:

$$2x \equiv 1 \pmod{3}$$

$$3x \equiv 2 \pmod{4}$$

$$3x \equiv 2 \pmod{5}.$$

3. Compute the following Legendre symbols. 177 is not prime, but all other integers that show up are.

(a) $\left(\frac{-157}{241}\right)$

(b) $\left(\frac{177}{179}\right)$

4. Find all solutions, if any, of the following quadratic equations:

(a) $x^2 \equiv 17 \pmod{64}$

(b) $x^2 \equiv 34 \pmod{81}$

(c) $x^2 \equiv 59 \pmod{135}$

(d) $x^2 \equiv 25 \pmod{80}$

(e) $x^2 + 20x + 30 \equiv 0 \pmod{105}$