Math 480 - Fall 2020 Homework 2

Due October 9th, 2020

Why are numbers beautiful? Its like asking why is Beethovens Ninth Symphony beautiful. If you dont see why, someone cant tell you. I know numbers are beautiful. If they arent beautiful, nothing is. — Paul Erdős

Turn in:

(1) Use the extended version of Euclid's Algorithm (by hand) to find integers x and y satisfying

$$119x + 98y = 7.$$

(2) Solve the equation

 $7x + 4 \equiv 2 \pmod{22}.$

(3) Find an integer that simultaneously satisfies the equations

$$x \equiv 1 \pmod{3}$$
$$x \equiv 3 \pmod{5}$$
$$x \equiv 0 \pmod{8}.$$

(4) For each k > 1, use the Chinese Remainder Theorem to prove that there are k consecutive composite numbers, each divisible by a different one of the first k prime numbers.