CAAP Math, Mr. Church, Homework 7

Due at the beginning of class on Monday, August 4

`http://www.math.uchicago.edu/~tchurch/`

1. Read the first part (just pages 115 and 116) of Section 4.1, "The Division Algorithm", and all of Section 4.2, "The Euclidean Algorithm and Greatest Common Divisors".

2. Do Exercises 4.3, 4.6, 4.11, and 4.13. Exercise 4.13 is copied from the book below, and then restated in the language of modular arithmetic from Wednesday's class, so you can compare them.

   Exercise 4.13 (**book version**): Let n be any integer.

   (a) Show that there exists an integer q so that one of the following is true: $n = 4q$, $n = 4q + 1$, $n = 4q + 2$, or $n = 4q + 3$.

   (b) Show that the remainder when n^2 is divided by 4 is either 0 or 1.

   (c) Show that if n is odd, then the remainder when n^2 is divided by 8 is 1.

   Exercise 4.13 (**modular arithmetic version**): Let n be any integer.

   (a) Show that one of the following is true: $n \equiv 0 \pmod 4$, $n \equiv 1 \pmod 4$, $n \equiv 2 \pmod 4$, or $n \equiv 3 \pmod 4$.

   (b) Show that one of the following is true: $n^2 \equiv 0 \pmod 4$ or $n^2 \equiv 1 \pmod 4$.

   (c) Show that if n is odd, then $n^2 \equiv 1 \pmod 8$.