Quantitative Reasoning 28:
The Magic of Numbers

Homework 18

Assigned on Monday November 5th
Due at 12 noon Wednesday November 7th

Please submit problem sets at the end of the relevant lecture, or leave in the box labeled QR28 outside the Math Department's main office, on the third floor of the Science Center (Room 325).

Reading:

Gross-Harris, Chapter 17

Problems:

Please explain your reasoning and show your work.

For this homework, when working $\pmod{n}$, your final answer should be a symbol in the range $0, 1, \ldots, n-1$.

1. The goal of this problem is to find $5/17 \pmod{31}$. Note that 31 is prime, and thus we know that a solution exists.
   (a) Use the Euclidean Algorithm to find integers x and y such that $17x + 31y = 1$.
   (b) Using part (a), what is $1/17 \pmod{31}$?
   (c) Using part (b), find $5/17 \pmod{31}$.
2. Use the Euclidean algorithm to compute the following.
   (a) $1/13 \pmod{97}$.
   (b) $1/73 \pmod{17}$.
3. Compute the following divisions:
   (a) $7/10 \pmod{41}$.
   (b) $10/2 \pmod{31}$.
   (c) $5/16 \pmod{17}$.