Quantitative Reasoning 28:
The Magic of Numbers

Homework 20

Assigned on April 4
Due at 5:00 p.m. April 6

Please submit problem sets to the boxes outside the Math Department's main office, on the third floor of the Science Center (Room 325).

Reading:

Gross-Harris, Chapters 18 and 19

Problems:

Please explain your reasoning and show your work.

1. What is the last digit of 7^{991}?
2. (a) Create a power table for arithmetic (mod 13). This will be a table whose rows correspond to numbers in arithmetic (mod 13) (that is, the numbers $\{0, 1, 2, \ldots, 12\}$), and whose entries are their various powers. Compute the powers from the 1st up to the 13th power for each number. (Recall the computational tricks from lecture; it's much less work that way.)
   (b) Compute $2^{742} \pmod{13}$.
   (c) What is the 5th root of 4 (mod 13)?
   (d) What is the 11th root of 9 (mod 13)?