Quantitative Reasoning **28**:
The Magic of Numbers

Homework **28**

Assigned on Wednesday December 12th
Due at 12 noon **Friday** December 14th

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 24

Problems:

Please explain your reasoning and show your work.

1. (a) Find a generator for arithmetic mod 13.
   (b) Find a square root of $-1 \pmod{13}$.
   (c) Find all other generators for arithmetic mod 13. How many are there? (Does your answer agree with the general formula you learnt today?)
   (d) For each non-zero number a mod 13, find its *period* (i.e., the smallest number $k > 0$ such that $a^k \equiv 1 \pmod{13}$).