1. Compute some cyclotomic polynomials! We got up \( \Phi_6(x) \) in lecture. Do some more. Do you notice any patterns? What is \( \Phi_p(x) \) for a prime \( p \)?

2. Pick a couple small primes \( p \) (small two-digits, say). For each, find a primitive root mod \( p \). Take powers to generate all of \( \mathbb{F}_p^\times \) and record the squares. Then determine whether the congruence

\[ x^2 \equiv 389 \pmod{p} \]

has a solution.

3. Investigate roots of unity and orders of elements in \( \mathbb{F}_p \) for various primes \( p \), as we did in lecture a bit.

Start by picking smallish prime \( p \), writing down the nonzero elements in \( \mathbb{F}_p \) and taking powers to determine their orders. (This next part will make much more sense after the lecture.) We know that \( x^{p-1} - 1 \) splits completely into linear factors over \( \mathbb{F}_p \). Group the factors into the roots of various orders and compare those groups with the reduction mod \( p \) of the corresponding cyclotomic polynomial.