

## Elementary number theory

- Divisibility, Euclidean algorithm, congruences, residues
- Primes, heuristics concerning the distribution of primes
- Fermat's Little Theorem  $a^p = a \pmod{p}$
- Primes  $\equiv 1 \pmod{4}$  as sums of squares
- Euler function  $\varphi(m)$ , multiplicativity,  $\sum_{d|m} \varphi(d) = m$
- $(\mathbb{Z}/p\mathbb{Z})^\times$  is cyclic, primitive roots
- Integral and fractional part, computing  $p$ -powers in  $n!$
- Legendre symbol, quadratic reciprocity via Gauss sums
- Outlook: some open problems