

### Number Theory Homework #3

1. Find the inverses of all residues  $1, 2, \dots, 10$  modulo 37.
2. Solve the congruences:
  - (a)  $6x \equiv 15 \pmod{21}$ ;
  - (b)  $36x \equiv 8 \pmod{102}$ ;
  - (c)  $34x \equiv 60 \pmod{98}$ .
3. Show that  $\sqrt{15}$  is an irrational number, that is, there is no rational number  $\frac{a}{b}$  such that  $(\frac{a}{b})^2 = 15$ . (Hint: use the unique factorization into primes.)