

### Topics for Final Exam

All topics from Midterms # 1 and 2, plus:

- Applications of the Sylow theorems.
- Rings, ideals, homomorphisms, quotient rings.
- Integral domains, characteristic, field of quotients.
- Prime ideals, maximal ideals, characterization by quotient.
- Rings of polynomials, irreducible polynomials, division, ideals of  $F[X]$  are principal (when  $F$  is a field).
- Roots of polynomials, factor theorem, irreducibility criteria (reduction mod.  $n$ , Eisenstein).
- Field extensions, algebraic and transcendental elements, minimal polynomial, degree.
- Root/splitting fields, simple extension theorem.