

# Algebra Qual Prep: Summer, 2008.

## Modules

August 11, 2008

### 1. Structure theory

- (a) Left versus right
- (b) Submodules, Irreducibility
- (c) Quotient modules
- (d) Homomorphism/Isomorphism Theorems
- (e) Exact sequences (split)
- (f) Presentations (generators and relations)
- (g) Torsion (annihilators)
- (h) Rank
- (i)  $Hom()$
- (j) Tensor products
- (k) Schur's Lemma
- (l) Fundamental Theorem of f.g. Mods over PID
- (m) Rational canonical form
- (n) Cayley-Hamilton
- (o) Wedderburn

### 2. Types of Modules

- (a) Vector spaces
- (b) Free
- (c) over a PID
- (d) Algebras
- (e) Noetherian/Artinian
- (f) Group algebras