

Outline for Preliminary Examination

Examiners: Brian Conrad & Chris Skinner

Student: Bryden Cais

Date: **August 10, 2004**

Time: 2–4 pm.

Algebraic number theory

- Basic algebraic number theory (local and global fields)
- Local class field theory
- Idélic and ideal-theoretic formulation of global class field theory
- Ray class groups: definitions and descriptions in the above formulations
- Kronecker-Weber theorem
- Chebotarev Density Theorem
- Größencharaktere
- Artin L-functions (definitions)
- Examples (quadratic fields, cyclotomic fields)
- $\mathbf{Z}_p$ -extensions

Algebraic geometry

- Basics of varieties
- Basics of sheaves and schemes
- Coherent cohomology of schemes
- Curves (genus, Riemann-Roch Theorem, Hurwitz genus formula, Picard group, etc.)
- Curves of genus zero (over any field)
- Elliptic curves (over any field)

Abelian Varieties

- Basics of abelian varieties
- Isogeny-invariance of BSD (no restriction on ground field) as in Milne's ADT, §7.

Brian Conrad

Chris Skinner