

Title

D. Zack Garza

Thursday 20th August, 2020

Contents

1 Thursday, August 20

1

1 Thursday, August 20

References: <https://www.daniellitt.com/etale-cohomology>

Prerequisites:

- Homological Algebra
 - Abelian Categories
 - Derived Functors
 - Spectral Sequences (just exposure!)
- Sheaf theory and sheaf cohomology
- Schemes (Hartshorne II and III)

Outline/Goals:

- Basics of etale cohomology
 - Etale morphism
 - Grothendieck topologies
 - The etale topology
 - Etale cohomology and the basis theorems
 - Etale cohomology of curves
 - Comparison theorems to singular cohomology
- Prove the Weil Conjectures (more than one proof)
 - Proving the Riemann Hypothesis for varieties over finite fields
- Topics
 - Weil 2 (Strengthening of RH, used in practice)
 - Formality of algebraic varieties (topological features unique to varieties)
 - Other things (monodromy, refer to Kass' AWS notes)

What is Etale Cohomology? Suppose X/\mathbb{C} is a quasiprojective variety: a finite type separated integral \mathbb{C} -scheme.

If you take the complex points, it naturally has the structure of a complex analytic space $X(\mathbb{C})^{\text{an}}$: you can give it the Euclidean topology, which is much finer than the Zariski topology.