Title: Lefschetz fixed point theorem and counting solutions to polynomial on finite fields

Introduction:

1. Introduce idea of counting solutions of polynomials on finite field = counting points on some algebraic variety

Example: projective plane, y^2 = x^3 + 1, Grassmanian

1. Observe coefficients of (q^1/2)^k is the k-th Betti number of these varieties
2. Explain briefly homological Lefschetz fixed point theorem explains this connection
3. Outline remaining sections

Section 2: Backgrounds on manifold, and algebraic topology

1. Intersection theory
2. Cohomology of examples
3. Complex manifolds have only positive intersection

Section 3: Lefschetz fixed point theorem

Section 4: Fixed point of Frobenium and counting points