Cameron Gordon Day 1

Thm (Alexander) S^3 is irreducible; that is, every smooth S^2 bounds a ball.

Def M is prime if $M = M_1 \# M_2 \Rightarrow M_1 = S^3$ or $M_2 = S^3$

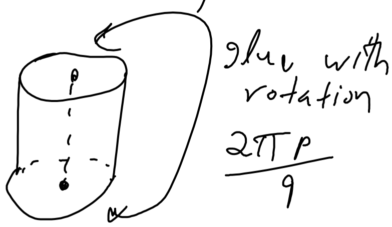
Thm A prime M^3 is irreducible or $M \cong S^1 \times S^2$

Thm (Kneser, Milnor) Unique factorization into primes for abitrary M^3's.

Def A 2-disk $(D, \partial D) \subset (M, \partial M)$ is essential if ∂D does not bound a disk in ∂M

Thm (Bonahon) If M is irreducible, then there is a submanifold that contains ∂M and (up to isotopy) all essential boundary disks in M.

A Seifert Fiber Space (SFS): $M = \amalg$ circles, locally like

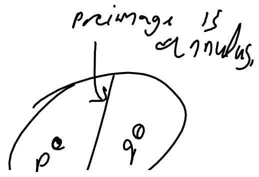


The space of fibers of an SFS is a surface F.

JSJ for knot complements. Let M_K be the knot complement of $K \subset S^3$. There are four possibilities:

do we need to assume that K is prime?

1. $K = V$, $M_K = S^1 \times D^2 \supset$ ess. D^2
2. $K = T_{p,q}$ M_K is an SFS w/



3. Satellite knots have an essential T^2 in their complements.

This is iff?. If M_K has an essential T^2, K is a satellite.

4. otherwise M_K is hyperbolic.