

Dehn Surgery and 3-Manifolds Exercise Set #3

Exercise 1: Which knot is this?

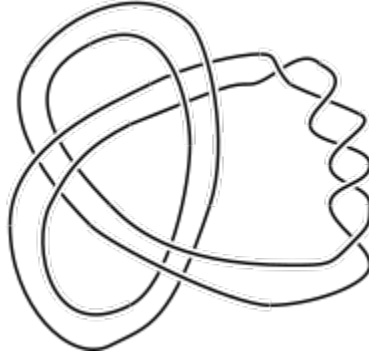


Figure 1: Not a torus knot.

Exercise 2: Given a genus n handlebody X and knot $K \subset \partial X$. Show that the following are equivalent definitions of primitive.

1. $X[K]$ is a genus $n - 1$ handlebody;
2. There is a properly embedded disk $D \in X$ such that K meets ∂D transversely at one point;
or
3. $[K]$ belongs to a basis for the free group $\pi_1(X)$.

Exercise 3: Do exercise 2 of Lecture 3 in Gordon's notes.

Exercise 4: Let K be a nontrivial knot in S^3 such that $S^3_{m/l}(K)$ is a lens space $L(p, q)$. Show that $[K']$ is null-homologous in $L(p, q)$ if and only if $m = 1$.

Exercise 5: Suppose K is a non-torus knot in S^3 and $r \in \mathbb{Q}$ with $r \neq 0$. Show that if K is amphicheiral then $S^3_r(K)$ is not a lens space.