

Homework 10
Geometric Topology
Math 99r – Harvard University
Due Monday, 1 December 2003

1. Show how to change the crossings of the knot projection $K = 9_{33}$ in Adams' appendix, leaving the diagram otherwise unchanged, to obtain a projection K' of the unknot.
2. Show the writhe of an oriented link projection is invariant under Reidemeister moves II and III.
3. Compute the writhe of the knots 6_3 and 8_3 using the projections in Adam's Appendix.
4. Compute the bracket polynomial $\langle U \rangle$ for the unknot U drawn below.

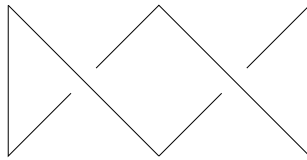


Figure 1. The unknot U with two twists.

5. Compute the polynomial $X(K)$ for the trefoil knot 3_1 .
6. Prove that the trefoil knot is not equivalent to its mirror image. (Hint: how does $X(K)$ change when K is replaced by its mirror image?)
7. Show that the Jones polynomials of the three links shown in Adams Figure 6.13 satisfy the skein relation

$$t^{-1}V(L_+) - tV(L_-) + (t^{-1/2} - t^{1/2})V(L_0).$$