Homework 13

Math 101 — Sets, Groups and Knots

1. Draw a picture of the trefoil knot and its mirror image, and compute the knot group for both. Then show the groups you get are isomorphic.

2. Compute the writhe of the knots 3_1, 5_1, 6_3 and 8_3 using the projections in Adam's Appendix.

3. What is the bracket polynomial of the usual projection of the unlink with n components?

4. Compute the bracket polynomial $\langle U \rangle$ for the unknot U drawn below.

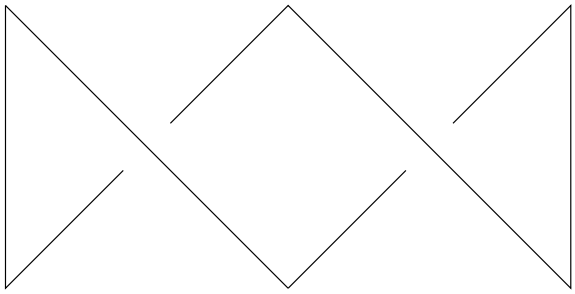

Figure 1. The unknot U with two twists.

5. Compute $\langle 3_1^+ \rangle$ for the positive trefoil (all crossings safe).

6. Compute $w(K)$, $\langle K \rangle$, $X(K)$ and $V(K)$ for $K = 4_1$ the figure eight knot, using the projection shown in Adams' appendix. (You can use previous calculations of $\langle K \rangle$ for the trefoil knot and Hopf link as part of your calculation.)

7. Using Adams' appendix, write down the Jones polynomial for the knot 5_1. Then explain why 5_1 is not equivalent to its mirror image.