

Math 139 Last Homework

DUE: Thursday May 3, 2007.

References: Knots and Links Chapters 8, 9 and Section III of Knots, Links, Braids and 3-manifolds by Prasolov and Sossinsky.

- 1) Question 7 of Chapter 8 exercises page 214 Knots and Links.
- 2) Show that mutants have the same bracket polynomial. (Mutants are defined on page 180 of Knots and Links.)
- 3) *Class exercise:* Calculate the bracket polynomial of knots of 4 or more crossings. (Just pick one for each person in the class.) In your solution, please show which resolutions you use and check your answer.
- 4) The $(2, n)$ -torus knots can all be drawn as shown below where n , the number of crossings, is odd. Using the labeling suggested, work out a formula expressing the generator x_k of the Wirtinger presentation in terms of the generators x_1 and x_2 . Now using the two crossings furthest to the right in the diagram, write x_1 and x_2 in terms of themselves and hence write down a presentation of the group of this knot. Simplify to show that the knot group is isomorphic to $\langle a, b : a^n = b^2 \rangle$.
- 5) Prove that the closures of the two braids $b_1, b_1^{-1} \in B_2$ coincide, as well as those of $b_1^2, b_1^{-2} \in B_2$. Prove that the closures of the two braids $b_1^3, b_1^{-3} \in B_3$ are distinct, as well as those of $b_1 b_2 b_1^{-1}, b_2^3 b_1^{-2} \in B_3$.

