Math 361: Introduction to Topology
Asst. 5, due W., 3/07

• read sections 2.2-2.6 of Messer/Straffin

You should submit at least 8 of the following problems.

Required

1. This week you will choose your very own 'pet knot'. Is your knot *tricolorable*? (This is what the authors call 'colorable' in §2.4.) Either show that it is or prove that it is knot.

2. The **writhe** of a knot diagram is the sum of the signed crossing numbers (of the knot crossing itself).
   (a) Compute the writhe of the following knots: 0_1, 3_1, 4_1, 5_1, 5_2.
   (b) Draw two different diagrams of your pet knot. Is each diagram reduced? (Draw at least one reduced diagram.) Compute the writhe of each diagram.

3. Is the writhe of a knot diagram invariant under all three Reidemeister moves? (i.e., is *writhe* a knot invariant?) If not, which moves preserve writhe? which ones change it (and how)?

4. 2.3.3

5. 2.3.4

6. 2.3.7

Optional Problems

7. Find a sequence of Reidemeister moves taking the figure-eight knot 4_1 to its mirror image.

8. If a knot projection has n crossings, explain why there are at most 2^n different knot diagrams that result.

9. *** Given a knot projection, find a method for resolving the crossings that guarantees the resulting knot diagram produces an unknot.

10. *** Show there are no knots with crossing number $Cr(K) = 2$.

These problems are also optional:
2.2.4, 2.2.8
2.3.8, 2.3.11 ***

Problems marked with stars *** indicate that gold stars will be awarded for correct, complete answers to them. (Please cite any sources outside of our course book & notes you use on these and other problems.)