KnotPlot Exercise #1: Knot Families
Changing the Culture 2000 Workshop

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28 April 2000

Knot Families

Knots come in a number of different families. Here we'll construct a few of those. The first family are *torus knots*, these are knots that can be "drawn" on the surface of a regular torus (a doughnut) without crossing any lines.

What to do

Start KnotPlot You first should get a copy of the two page handout with a very quick introduction to KnotPlot. If you're already running KnotPlot, the first thing to do is to type in the command reset all or click on the "Reset" button to get KnotPlot into a "fresh state" to start experimenting (you might not always have to do this, but the exercise may not work as expected if KnotPlot is in some weird state).

Make some random torus knots Type in torus without any arguments to make a few different torus knots (and links, the ones with more than one component). You can use the single forward quote (next to the RETURN key) as a shorthand to repeat the last command. KnotPlot will tell you what kind of torus knot it's creating.

What the numbers mean The torus command takes three arguments, the first two are of mathematical interest and describe how many times the knot wraps about the torus in the two different directions. Try torus 2 3 to create a trefoil, for example. This means that the trefoil belongs to the family of torus knots. Also try torus 5 11, torus 2 8, and maybe torus 2 4.

Reverse the order of the numbers Instead of torus 2 3 try torus 3 2. You might be surprised to find out that *if you switch the order of the numbers, you get the same knot.*

Increase the number of beads If you enter something like torus 7 48 you get a mess. Click on the "Beads & Sticks" button to see why. There aren't enough "beads" to make a good knot. Try increasing the number of beads by supplying a third number, for example type torus 7 48 200 and click on "Smooth Tubes" again (but reduce the thickness of the tube to 0.2 by changing the "cyl-rad" slider, so that you can see the knot better). Now try torus 48 7 500 and remember that these two are the same knot!