

KnotPlot Exercise #2: Braids

Changing the Culture 2000 Workshop

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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).

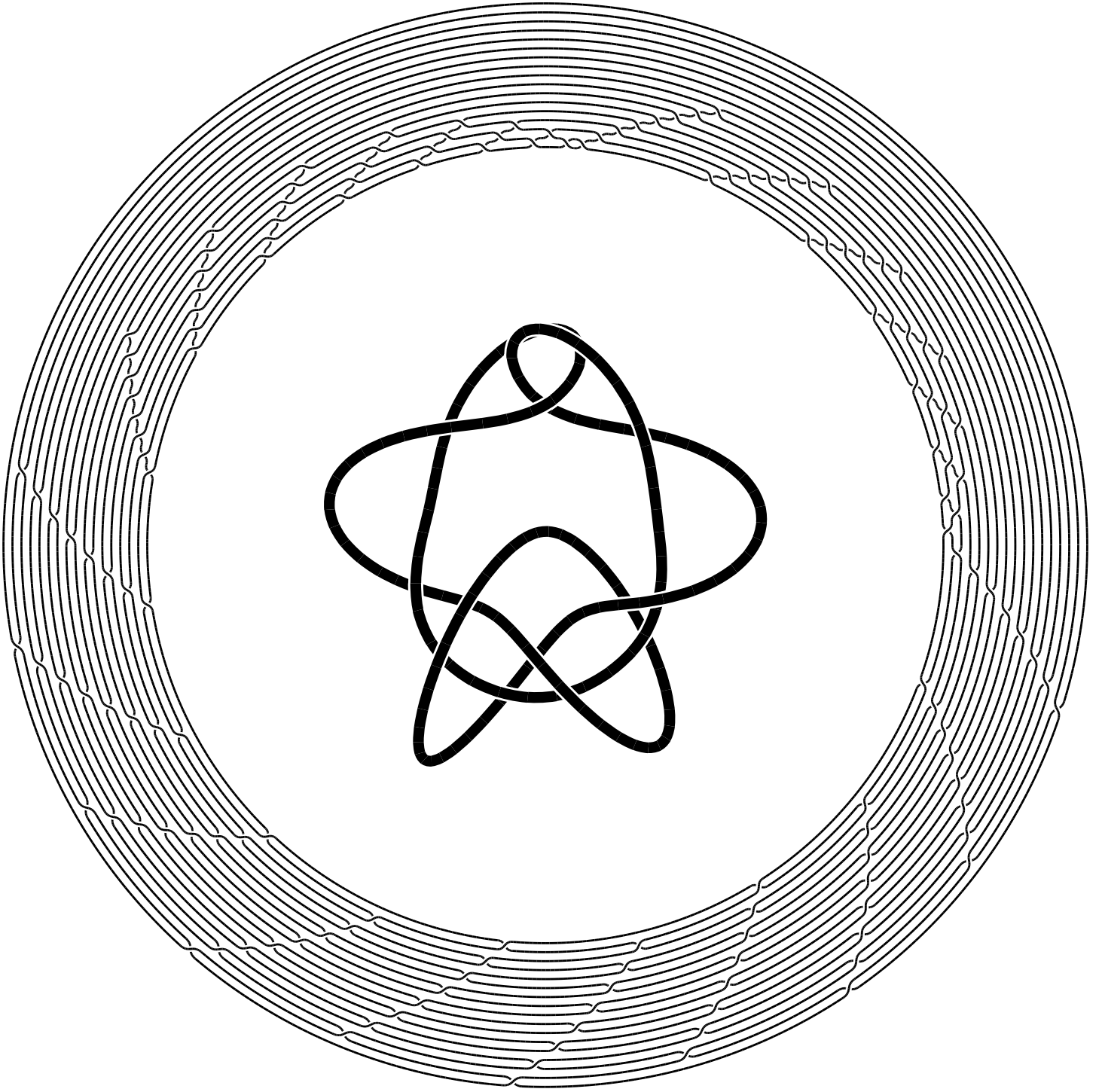
Try the random braid demo Click on the "Demo" button, then click "Load Demos". Finally, click on "More demos" near the bottom right. Try clicking on the "Random braid" button a few times, and watch what KnotPlot prints out in the console window.

Make the braid into a knot or a link After you get a nice braid, click on the "Warp the braid" button. This closes the braid, creating a knot or a link.¹

Try entering braid commands The basic braids are denoted in KnotPlot by the letters a, b, c, ..., for "positive" braids, and A, B, C, ..., for "negative" braids. Try the following commands: `braid a` `braid A` `braid aA` `braid b` `braid abc` and so on. You can also exponentiate the braids and use parenthesis, as in `braid a^4b` `braid (ab)^3` `braid (ab)^4c^3` `braid (c(aD)^3)^2f` and so on.

Try warping a braid you create yourself See what it takes to make a knot (try relaxing it). How about a link? Cool fact: *all knots and links can be created by closing some braid*. An example is `braid BacB(Ac)^2B^2c` (and then closing it with the warp button) gives you the same knot as `load 10.102`. On the opposite of this page is a more complicated example, created with the command `braid (BDFHJLNPACGEIKMO)^5 (abcdefghabcefgabcefabcdabcaba)^2`

¹There is a bug in the demo that the warping doesn't work properly if the braid is much wider than it is tall.



Closed braid with word $(\sigma_2^{-1}\sigma_4^{-1}\sigma_6^{-1}\sigma_8^{-1}\sigma_{10}^{-1}\sigma_{12}^{-1}\sigma_{14}^{-1}\sigma_{16}^{-1}\sigma_1^{-1}\sigma_3^{-1}\sigma_5^{-1}\sigma_7^{-1}\sigma_9^{-1}\sigma_{11}^{-1}\sigma_{13}^{-1}\sigma_{15}^{-1})^5 \times$
 $(\sigma_1\sigma_2\sigma_3\sigma_4\sigma_5\sigma_6\sigma_7\sigma_8\sigma_1\sigma_2\sigma_3\sigma_4\sigma_5\sigma_6\sigma_1\sigma_2\sigma_3\sigma_4\sigma_5\sigma_1\sigma_2\sigma_3\sigma_4\sigma_1\sigma_2\sigma_3\sigma_1\sigma_2\sigma_1)^2$ and the same knot
 after simplification (centre).