Some Elementary Tiling Theory
(materials and exercises)

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(This file can be downloaded as `http://sf.anu.edu.au/~oxd900/tiling-exercises-I.tex`.)

1 Gavrog software: 3dt and Systre

1.1 Download

- Normally: go to `gavrog.org` and follow the link to the download page. Select "3dt", then locate the latest file whose name starts with "GavrogInstaller".
- This week: a special preview of the upcoming Gavrog version 0.3.2 can be found at `http://sf.anu.edu.au/~oxd900`.

1.2 Installation

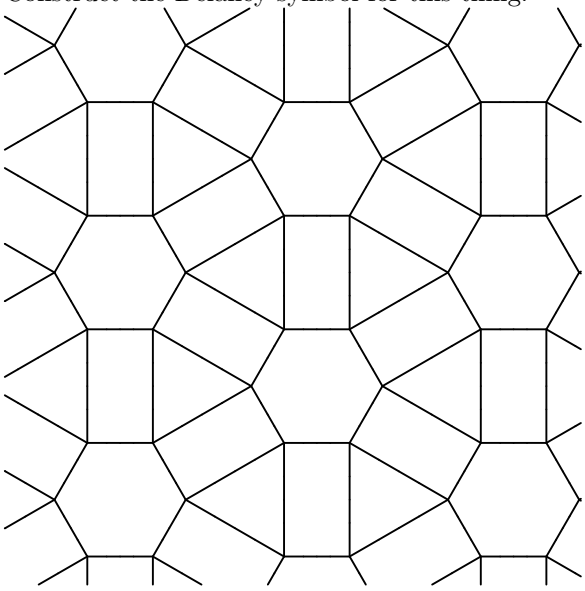
- Install Java version 1.5 or later from `java.com` (not needed on lab computers.)
- Open the .zip file with Archive Manager or such and extract the .jar file (this step is normally not needed.)
- Double-click on the .jar file. If that does not work, right-click and select "Open with Java". Last resort: get a terminal window, change to the folder you put the .jar file in and type in `java -jar <filename>`.
- On the lab computers: when asked for an installation path, do *not* use the default. Instead, install as "3dt" under your "MyDocuments" folder.

1.3 Documentation

- For Systre: `http://gavrog.org/Systre-Help.html`, or built-in from Help menu.
- For 3dt: `http://gavrog.org/README`, or README file in installation folder.

2 Exercises

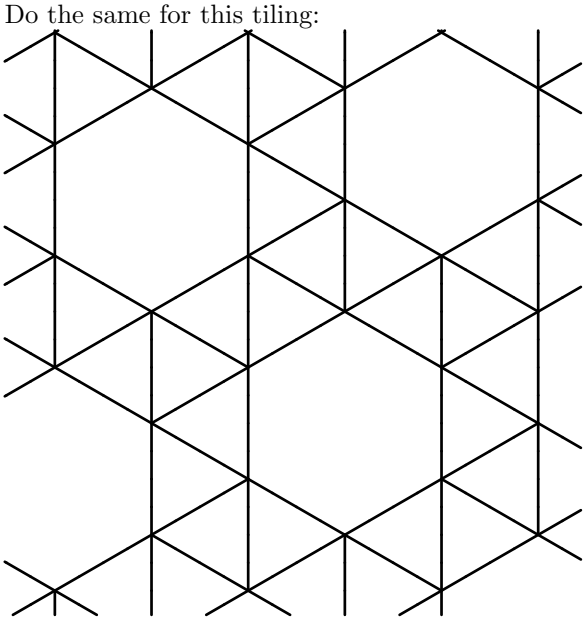
1. • Construct the Delaney-symbol for this tiling:



   • Create a file in ".ds" format containing that symbol.

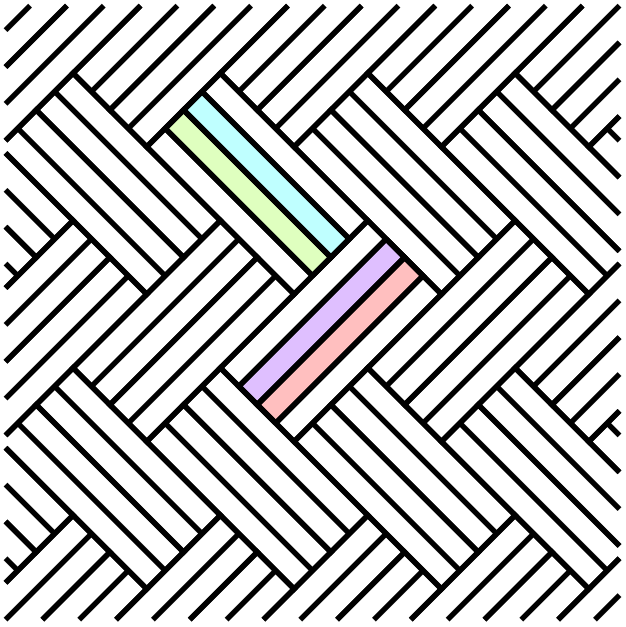
   • Open it in 3dt and see what happens.

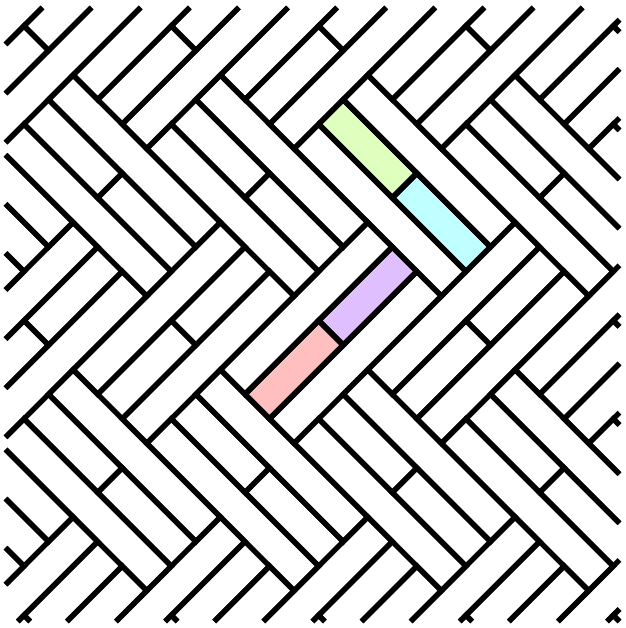
2. • Do the same for this tiling:



   • Do you recognize the symbol?

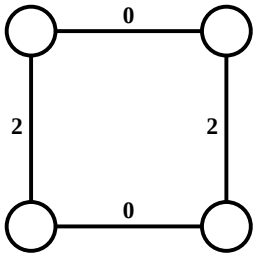
3. • Show that these tilings are equivariantly equivalent:





• What do you see when you feed the symbols into 3dt?

4. • Describe all ways in which the incomplete Delaney-symbol below - with numbers 0 and 2 instead of red and blue edges indicating the s_0 and s_2 relations - could be completed. Is the list finite?



- What if you require the symbols to correspond to tilings of the euclidean (=ordinary) plane? *(Hard!)*
- What can you say about the transitivity of the resulting tilings?
- Can you find more tilings that fullfil the same transitivity condition?