TUTORIAL HOUR - 20/8

1 Symmetries of a Triangle

If you would like to toy with the symmetries of the equilateral triangle you can run the `triangle.txt` file[1] on SAGE's online platform.

SAGEMATH is a python based mathematics software[2]

2 Fractals

The fractal image was generated in TEX; You can start experimenting with TEX here. The image can be generated in different languages, for instance - python's turtle library.
The `fractal.txt` file contains an L-system[3] implementation.

3 Assignment

This is not evaluative

The file `fractal.pdf` contains an image of the fractal. This assignment will cover what happens when the '$mrmr \equiv$ *do nothing*' rule is enforced.

Pick any point on the biggest triangle as your starting location - regard this as the *do nothing* state.
In a counter-clockwise manner, label all sides of all triangles with arrows. You cannot traverse against the direction of the arrow - label these arrows as r.
Lines that move out from a bigger triangle can be considered as downward escalators that drop you to a smaller triangle - label these arrows as m.

Consider the input strings $m, rmr, rrmrr$. Move along the fractal and see where you end up in each case. Under the $mrmr$ rule what happens to these strings?
Repeat the same with the input strings $rm, mrr, rrmr$ and $rmrr, mr, rrm$.
Can you say the all triangles at depth 1 (let the biggest triangle be at depth 0) are essentially the same under the $mrmr$ rule?

[1] If the same can be displayed in shorter lines of code, please send your implementation.
[2] You could do a GSoC with them.
[3] Read more here

Consider the input strings $mrmr$, $rmrm$, $rrmrmrr$, where are they on the fractal? What happens to them under the $mrmr$ rule?

Can you say all triangles at an even depth are identical to the one at depth 0 and that all triangles at an odd depth are identical to the three (essentially the same) at depth 1?

With these two triangles can you relate the crumpled fractal to the `roadmap.png` file?