

Nikolay. Challenging Problems

[Good Luck]

- Plot the density distribution of the first 1000 zeros of zeta function at $1/2 + it$ for real t .
- Reproduce a fractal picture from https://en.wikipedia.org/wiki/Newton_fractal
- Do a function which will randomly replace pluses by minuses in your notebook. Once you do this, create a (slightly more complicated) function which will transform a notebook to a new notebook where every non system identifier (something satisfying **LetterQ**) is randomly capitalised. Eg if you have some identifier like **Energy** it might become **eNErGy**. Each identifier should be randomly capitalised in the same way if it appears again in the notebook.
- Using Mathematica retrieve the list of all participants from <http://perimeterinstitute.ca/conferences/mathematica-summer-school-2015> and randomly pick 5 people.
- Reproduce the lindep function of <http://wayback.cecm.sfu.ca/projects/EZFace/> using **LatticeReduce**.

In particular you should get

```
Lindep[35.420672822890801854334799214593577536648656635904,Zeta[3],Zeta[5]]
```

to give $\{-1, 1, 33\}$

i.e. your function should decode that a number is a simple combination of zeta functions.

In the website this runs as

```
lindep([35.420672822890801854334799214593577536648656635904,z(3),z(5) ])
```