

OS Homework 20

Daniel Rogers

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dmr336@scarletmail.rutgers.edu

Please do not post my answers

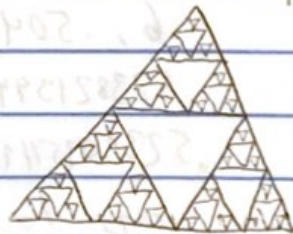
1.

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1

↓ mod 2

1
1 1
1 0 1
1 1 1 1
1 0 0 0 1
1 0 1 0 1 0 1
1 1 1 1 0 1 1 1

This (continued infinitely) is a fractal, as it has self-similarity and can be defined recursively.



2. i) .5, .25, .1875, .15234375, .1291351318357375,

.11245924956165254, .09981216674968249, .08784761811841000,

.081776722886644556, .07508929631879575

seems to converge to one point (0)

ii) $.5, .625, .5859375, .606536865234375,$
 $.5966247408650815, .6016591486318896, .5991635437485985,$
 $.6004164789780495, .5997913268741273, .6001042277017528$
seems to converge to one point from two
directions (.6)

iii) $.5, .775, .5405825000000001, .7698959140625,$
 $.5491781736597441, .7675026724300255, .553171927526629,$
 $.7662357552099034, .5552674202082185, .7655310880169375$
seems to converge to two points (.55..., .76...)

iv) $.5, .875, .3828125, .826934814453125,$
 $.5008976948447526, .87499717950388, .3828199037744718,$
 $.826940887670016, .500883795893397, .8749972661668659$
seems to converge to four points (.382..., .500..., .826..., .874...)

3. The famous Feigenbaum constant is defined
as the limiting ratio of each bifurcation
interval to the next between every
period doubling of a one-parameter map.
It is a constant for functions approaching
chaos via period doubling.