Introduction to Complexity (Spring 2013)

6.8 Submit Unit 6 Homework » Unit 6 Homework

Instructions 1

See the detailed writeup, Homework6.pdf, on the Course Materials page. Also see that document for ungraded problems.

Question 2

Using the Mini-Life NetLogo model, try the initial pattern of five black cells, which Conway called the "R-pentomino" (see Homework pattern).

Put this pattern somewhere near the center of the lattice. Run the CA until the lattice has settled into a stable set of patterns. What a patterns you see? (Note that you may see patterns as rotated versions of the ones in the picture above. These still count as instances pattern.)

- Two blinkers, one beehive, and a block
- One beehive, three blocks, and a blinker
- One beehive, one mango, and a pond

Question 3

Using Mini-Life.nlogo, create an initial pattern like the one shown in Homework6.pdf, question 2, placing it near the center of the lat CA until the lattice has settled into a stable set of patterns. What are the final patterns you see? (Note that you may see patterns as r versions of the ones in the picture above. These still count as instances of the given pattern.)

- Four beehives
- Three blinkers
- One beehive, one mango, and a pond

Question 4

See the diagram of Elementary CA rule 90 in Homework6.pdf. What is the Wolfram code number, in base 10, of the inverse-color rul where 0s in the output states of rule 90 are changed to 1s, and vice versa? (That is, the inverse-color rule is **1 0 1 0 0 1 0 1**.)

- 85
- 165
- 205
- 213

Question 5

According to the definitions given in the lectures, which Wolfram class does the behavior of ECA rule 40 fall into? (Investigate this by ElementaryCAs.nlogo with this rule on several random initial configurations.)

- Class 1
- Class 2
- Class 3
- Class 4

Question 6

Same question as the previous one, but this time for ECA rule 144.

- Class 1
- Class 2
- Class 3
- Class 4

Question 7

What is the Lambda value of ECA rule 90?

- 3/8
- 4/8
- 5/8
- 6/8

Question 8

What is the Lambda value of ECA rule 32?

- 1/8
- 2/8
- 3/8
- 4/8

Question 9

Langton's hypothesis was that an ECA with Lambda close to 1/2 should typically have more complex behavior than an ECA with a mu Lambda value. Is this true when you compare the typical behavior of rule 32 and rule 90? [You can do this using ElementaryCAs.nlog

- Yes
- No