

1047-08-174

Steve Seif* (swseif01@louisville.edu), University of Louisville, Mathematics Department,
Louisville, KY 40292. *Constrained Eden: Algebras in parallel.*

Cellular automaton over a finite alphabet are examined as finite algebraic structures with one basic operation. A computational complexity problem, Constrained Eden, a finitary version of the Garden of Eden problem, is described. Two main results:

1. Constrained Eden provides the first examples of NP-complete problems associated with 1-dimensional cellular automata over a 2-element alphabet.
2. Constrained Eden problems are log-space equivalent to constraint satisfaction problems, and conversely.

Also considered are variations of Constrained Eden, in connection with decision problems involving solutions to systems of equations over a finite algebra. (Received January 27, 2009)