1113-05-307 **Charles Tomlinson*** (ctomlinson2@math.unl.edu), 203 Avery Hall, PO BOX 880130, Lincoln, NE 68588, and **Dominik Vu**. *Counting cycles in randomly constructed cellular automata.*

We discuss the behavior of cellular automata in which update rules are determined randomly for each cell. This investigation of random cellular automata follows that of many studies of the related Kauffman model, a random boolean network. Instead of defined geometric neighborhoods like in an automata, in the (n, k)-Kauffman model each cell has k randomly selected neighbors from among the n cells. Further, update rules are independently and randomly selected for each cell. The issues of how many limit cycles exist and how stable they are, have been central to the study of the model. Kauffman's original conjecture was that the expected number of cycles is $\sqrt{n}/2$. However, it was later shown the number of c-cycles, C_c, has the average behavior $E[C_c] > n^{l_c}$ where l_c tends to infinity with c; so the number of cycles is superpolynomial.

We study inhomogenous cellular automata along the same lines. In the more structured case of a k neighbor automata, with each cell's update rule selected independently and uniformly randomly, we show that $E[C_c] > 2^{a_c n}$ for sufficiently large n where a_c is independent of n. In the process we prove the existence of c cycles which can be used as the building blocks of larger automata for all c. (Received August 25, 2015)