1046-37-1568 **Jarkko Kari*** (jkari@utu.fi), Department of Mathematics, FI-20014 University of Turku, Finland. *Mortality and periodicity of dynamical systems.*

Let (X,F) be a topological dynamical system and let H be a fixed open subset of X, called the halting set. We call (X,F) mortal with respect to H if all orbits visit set H. The mortality problem is the algorithmic question to determine if a given system is mortal w.r.t a given halting set H.

The mortality problem is known to be undecidable for many families of dynamical systems. In particular, in 1966 P.K.Hooper proved it undecidable for Turing machines. For cellular automata, the problem is seen undecidable using the nilpotency problem. Recently we have shown the undecidability of the mortality problem for families of bijective systems: for reversible cellular automata (K, Lukkarila 2007), and for reversible Turing machines and reversible counter machines (K, Ollinger 2008).

The periodicity problem refers to the algorithmic question to decide if all orbits of a given dynamical system are periodic. The periodicity problem is undecidable among cellular automata, Turing machines and counter machines - all these results can be proved using the undecidability of the mortality problem (K, Ollinger 2008).

Finally, we demonstrate how the mortality problem of piecewise affine maps of the plane can be reduced to the domino problem, thus giving a new proof for its undecidability. (Received September 16, 2008)