

**Meeting:** 1003, Atlanta, Georgia, SS 26A, AMS-SIAM Special Session on Dynamic Equations on Time Scales; Integer Sequences and Rational Maps, I

1003-11-643      **Jeffrey C Lagarias\*** ([lagarias@umich.edu](mailto:lagarias@umich.edu)), Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1109, and **N. J. A. Sloane** ([njas@research.att.com](mailto:njas@research.att.com)), Information Sciences Research, AT&T Labs-Research, 180 Park Avenue, Building 103, Florham Park, NJ 07932-0971. *Approximate Squaring.*

This talk describes results on the approximate squaring map, which sends a real number  $x$  to  $x(\text{ceiling}(x))$ . If the initial data  $x_0$  is a rational number, then all iterates are rational. In this case one can raise the question: Must some iterate of  $x_0$  be an integer? This appears to be the case when  $|x_0| > 1$ , although it seems hard to prove. We show that this happens when the denominator of  $x_0$  is 2, and give partial results for larger denominators. We then consider a similar question for the approximate multiplication map, which sends  $x$  to  $r(\text{ceiling}(x))$ , where  $r$  is a fixed real number, with  $|r| > 1$ . If  $r$  is a rational number, and  $x_0$  is arbitrary, then one can ask if some iterate is necessarily an integer. We show will occur if the denominator of  $r$  is 2, with one exceptional value of  $x_0$ . Similarly, if the denominator of  $r$  is at least 3, this still holds for almost all input values  $x_0$ . The talk will conclude with some remarks on the case of non-rational inputs to the approximate squaring map. (Received September 25, 2004)