

## Chaos Assignment

June 21, 2000

Consider the "doubling map"

$$D(x) = \begin{cases} 2x & \text{if } 0 \leq x < 1/2 \\ 2x - 1 & \text{if } 1/2 \leq x < 1 \end{cases}$$

with domain  $[0, 1)$ . Equivalently, this function can be defined as  $D(x) = 2x \bmod 1$ . Use this function in completing the following.

1. By hand, calculate the first 15 terms in the orbit of  $1/9$ . Express each term as a fraction in reduced form. What is the long term forecast for this orbit?
2. Using your calculator, compute the first 25 terms in the orbit of  $1/9$ . Include ten decimal places for each term. What appears to be the long term forecast for this orbit?
3. Write a paragraph comparing/contrasting your observations from parts 1 and 2.