Math 4973 - Dynamical Systems

Homework #5

Assigned - 2011.07.11

Name: _____

---

1. Consider the two piecewise functions $f(x)$ and $g(x)$ for $x \in [0,3]$ defined as follows:

$$f(x) = \begin{cases} x+1, & 0 \le x \le 2 \\ -3x+9, & 2 < x \le 3 \end{cases}, \qquad g(x) = \begin{cases} 3-x, & 0 \le x < 1 \\ -2x+4, & 1 < x \le 2 \\ x-2, & 2 < x \le 3 \end{cases}$$

The graphs of these functions are given below:

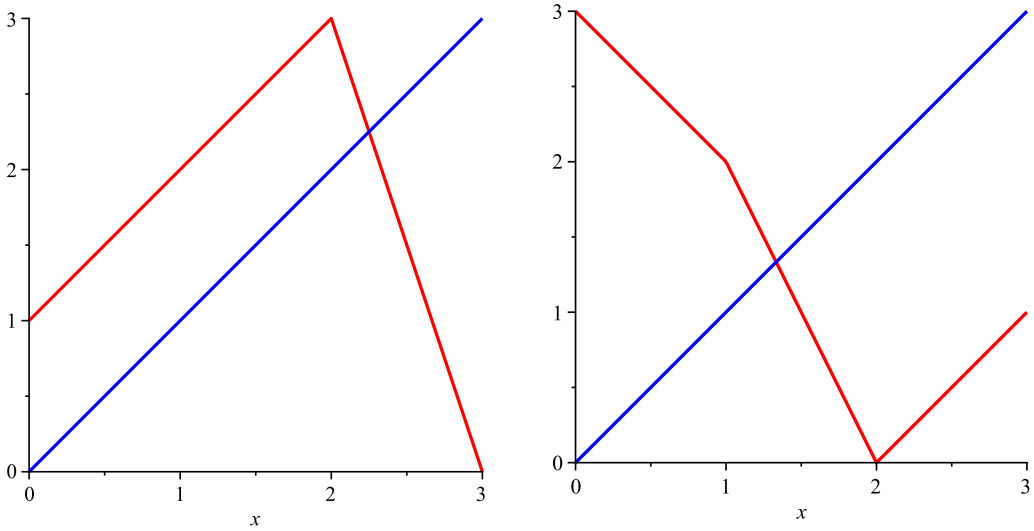

FIGURE 1. graph of $y = f(x)$ and $y = x$ (left), and $y = g(x)$ and $y = x$ (right).

Determine the periods of all possible periodic orbits for each of the maps f and g.

2. Compute the Schwarzian derivative of the fractional linear transformation $T(z) = \frac{az+b}{cz+d}$.

3. Find all values of x such that $SF(x) < 0$ if $F(x) = \tan^{-1}(x)$.