Universitatea Babeş–Bolyai
Facultatea de Matematică şi Informatică

Exam on Dynamical Systems.
June 13, 2012

1. Find the general solution of the following equations.
a) $x' = 2x$; b) $x_{k+1} = 2x_k$; c) $x'' - x' - 6x = 3t - \sin 2t$.

2. a) For what values of the real parameter a the system
$\dot{x} = ax - 5y, \quad \dot{y} = x - 2y$ has a center at the origin?
b) Find the equilibria and study their stability for
$\dot{x} = 1 - xy, \quad \dot{y} = x - y^2$.

3. Find the fixed points and the periodic points of minimal period 2 for the map $f : \mathbb{R} \to \mathbb{R}$, $f(x) = 1 - 2x^2$. Study their stability.