Universitatea Babeş-Bolyai, Facultatea de Matematică şi Informatică
Secţia: Informatică engleză
Curs: Dynamical Systems
Primăvara 2024

Seminar 5

1. We consider the linear planar systems

a) $\dot{x} = -y,\ \dot{y} = 5x$; b) $\dot{x} = -x,\ \dot{y} = 5y$;

c) $\dot{x} = -3x,\ \dot{y} = -2y$; d) $\dot{x} = x - y,\ \dot{y} = x + y$.

(i) Decide the type and stability of the equilibrium point at the origin.
(ii) Decide whether it has a global first integral.
(iii) Find a first integral (global or not). (except for d))
(iv) Represent the phase portrait (using the expression of the first integral). (except for d)) $\diamond$

2. We consider the nonlinear planar system
$\dot{x} = x(1 - x),\ \dot{y} = y(3 - y)$.
Study the stability of its equilibrium points.