

Universitatea Babeş-Bolyai
Facultatea de Matematică şi Informatică

Exam on Dynamical Systems
June 14, 2013

1. Find the solution of each of the following equations and its limit as $k \rightarrow \infty$.
 - a) $x_{k+2} + x_{k+1} - 2x_k = 0, \quad x_0 = 1, \quad x_1 = 1.$
 - b) $x_{k+2} - 6x_{k+1} + 9x_k = 0, \quad x_0 = 0, \quad x_1 = 1.$
 - c) $4x_{k+2} - 2\sqrt{2}x_{k+1} + x_k = 0.$
2. We consider the linear differential system $\dot{x} = -2y, \quad \dot{y} = x.$
 - a) Find its general solution.
 - b) Represent its phase portrait. Find a first integral.
 - c) What is the stability character of this system?