Introduction to Dynamical Systems and Chaos – course plan

Imre Péter Tóth, fall 2005

- course instructor:
  - name: Imre Péter Tóth
  - home phone number: (06) 20/537-22-56 (mornings, evenings)
  - office: Rényi Institute of Mathematics, room 110 (address: V. district, Reáltanoda u. 13-15 (near the subway stations 'Astoria' and 'Ferenciek Tere')
  - e-mail: mogy@renyi.hu (the easiest way to contact)
- book used: Kathleen T. Alligood, Tim D. Sauer, James A. Yorke: Chaos – An Introduction to Dynamical Systems; Springer, 1996
- planned topics:
  - one-dimensional and two-dimanesional maps as dynamical systems
  - limit sets and recurrence
  - chaos and Lyapunov exponents
  - symbolic dynamics, Smale horseshoe
  - fractals and fractal (box counting) dimension
  - differentioal equations as dynamical systems; limit sets and recurrence
  - Lorenz attractor
  - bifurcations
- things you will need to know:
  - calculus:
    - limits
    - differentiation, differentiation of functions in several variables
    - continuity, open/closed sets
  - linear algebra:
    - Euclidean space
    - matrix of a linear mapping
    - eigenvalues, eigenvectors of a linear mapping; canonical form
- Evaluation will be based on weekly homeworks (40% of all points), a written midterm exam (20%) and a written final exam (40%).

I intend to illustrate the material with as many examples of applications as possible. Those who are interested can have exercises requiring computer simulation both for homework and midterm.