

5. Homework Assignment

Dynamical Systems III

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<http://dynamics.mi.fu-berlin.de/lectures/>

due date: Wednesday, 27.05.2015

Problem 1: Consider the differential equation

$$\dot{x} = \lambda x + x^3 - x^5, \lambda \geq 0.$$

- (i) Determine the bifurcation points. What kind of bifurcation takes place?
- (ii) Determine the stability of the equilibria.

Problem 2: Consider the differential equation

$$\dot{x} = (x - a)(x - b)(x - c) - \lambda, \quad a, b, c, \lambda \in \mathbb{R}.$$

Determine the bifurcation points and bifurcation type for the bifurcation parameter λ when

- (i) $a \neq b \neq c$.
- (ii) $a = b \neq c$.
- (iii) $a = b = c$.