

Homework assignment

## Differentialgleichungen I - Problem Sheet 10

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<http://dynamics.mi.fu-berlin.de/lectures/12SS-Gurevich-Dynamics/>

due date: **Wednesday, June 20, 2012, at 13:00.**

**Problem 33:** Let  $K(t, s) : \mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$  and  $f(t) : \mathbb{R} \rightarrow \mathbb{R}$  be two continuous bounded functions. Prove that there exists  $T > 0$  such that there exists a unique solution to the following equation

$$x(t) = f(t) + \int_0^t K(t, s)x(s)ds$$

for  $|t| \leq T$ , satisfying  $x(0) = f(0)$ .

**Hint:** Consider using method of iterations.

**Remark:** Such equations are called linear Volterra integral equation of the second kind.