Exercise sheet 1

(due Wed. 26.3.14)

Exercise 1. Let $f_n : \mathbb{R} \to [0, \infty)$ be such that $f_n(x)$ is non-increasing in n for all $x \in \mathbb{R}$. Is it true that f_n and/or $-f_n$ Γ-converge?

Exercise 2. Given $f \in L^1(0,1)$, propose a variational formulation for

$$-(u'(x))' = f(x) \quad \text{for } x \in (0,1),\ u(0) = 3,\ u'(1) = 2.$$

Check, its well-posedness by Lax-Milgram and find the solution.

Exercise 3. Let $\phi : \mathbb{R}^n \to \mathbb{R}$ be convex and smooth. Show that ϕ is λ-convex iff $D^2\phi \geq \lambda I$ where I is the identity in $\mathbb{R}^{n\times n}$.

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