

7th Exercise sheet – Numerics for instationary differential equations

**Exercise 18:**

Consider the Gelfand triple

$$V \xhookrightarrow{\iota} H \xrightarrow{r_H} H' \xhookrightarrow{\iota'} V'$$

with Hilbert spaces  $(V, \|\cdot\|)$ ,  $(H, |\cdot|)$  and  $(V', \|\cdot\|_{V'})$ . Here  $\iota$  is a dense continuous embedding and  $r_H$  the Riesz isomorphism. Derive  $\iota'$  and show that it is also a dense continuous embedding.

**Exercise 19:**

Show that, under the assumptions of exercise 17

$$|u^{(k)}(t)| \leq \frac{C_k}{t^k} |u_0|, \quad \text{for } t > 0 \text{ and } k \geq 1.$$

**Solutions are discussed on June 15th.**

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