

Exercise
Information-Based Complexity

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Sheet 6

Return until 16.06.2015, into the box of the work group (Building 48, 6. floor)

Exercise 1:

Show that for the integration problem on $F = B_{C[0,1]}$ following holds if we admit only standard information:

$$\forall n \in \mathbb{N} : e_n(I) = 1$$

Exercise 2:

Let $f \in F \subseteq C[0, 1]$ and $S_1 f = \int_0^1 f(x) dx$ be the solution operator of the integration problem. Moreover, let $S_2 f = f$ be the solution operator of the approximation problem. Prove that for every $F \subseteq C[0, 1]$ the following holds:

$$e_n(S_1) \leq e_n(S_2)$$

Exercise 3:

Prove that

$$e_n(S^{App}, \Lambda^{st}) \geq cn^{-\frac{r}{d}}.$$

For the proof use the 'hat-function' ('Beulenfunktion') approach from the lecture (see. slide 87–90) and not the Gelfand numbers.