Selected topics on functional analysis
18.6.2019, Test F

1. **F**ind the norm of the operator $T : c_0 \to L^\infty([0,1])$ defined by the formula

$$(Ta)(t) = \begin{cases} a_1 & t \in [0, \frac{1}{2}) \\ a_1 + a_2 & t \in [\frac{1}{2}, 1], \end{cases}$$

where $a = (a_1, a_2, \dots) \in c_0$. Find the kernel of T.

2. **F**ind the distance of the function $g(x) = x$ from the subspace $M \subset L^2([-1,1])$, where

$$M = \operatorname{lin}\{1, x^2, x^3\}.$$

Each problem is graded by at most 15 points. To pass the written part of the exam it is neccessary to get at least 15 points.

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