

Selected topics on functional analysis

6.9.2019, Test G

1. Find the spectrum and point spectrum of the operator $T : L^\infty([-1, 1]) \rightarrow L^\infty([-1, 1])$ defined by the formula

$$(Tf)(t) = f(t) \operatorname{sgn} t.$$

If the point spectrum is non-empty, find all eigenvectors.

2. Find the norm of the operator $S : l^2 \rightarrow l^\infty$ defined by the formula

$$S(x_1, x_2, x_3, x_4, \dots) = (x_1 + x_2, x_3 + x_4, \dots).$$

Find all vectors where the norm is attained.

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

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