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LINEABILITY AND SPACEABILITY AMONG SETS OF INTEGRABLE FUNCTIONS

We show that the set of Lebesgue integrable functions in $[0,1]$ which are not essentially bounded in any nonempty open subset of $[0,1]$ is spaceable, improving a result from [4]. We prove that the set of Kurzweil integrable functions which are not Lebesgue integrable is spaceable in the Alexievicz norm. We also show that $\mathcal{C}^0$ admits an infinite dimensional subspace S such that each element of the $C([0,1])$-closure of S is a primitive to a Kurzweil integrable function, in connection to a classic spaceability result from [6].

References

[1] R. Aron, V. I. Gurariy and J. B. Seoane, *Lineability and spaceability of set of functions on* $\mathbb{R}$*,* Proc. Amer. Math. Soc., **133** (2005), 795–803.

[2] P. Enflo and V. I. Gurariy, *On lineability and spaceability of sets in function spaces,* to appear.

[3] V. Fonf, V. I. Gurariy and V. Kadeč, *An infinite dimensional subspace of* $C([0,1])$ *consisting of nowhere differentiable functions,* C. R. Acad. Bulgare Sci. **52** (1999), 11–12, 13–16.

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[4] F. J. García-Pacheco, M. Martín and J. B. Seoane-Sepúlveda. *Lineability, spaceability, and algebrability of certain subsets of function spaces,* Taiwanese J. Math., to appear.

[5] Gordon, R. A., *The Integrals of Lebesgue, Denjoy, Perron and Henstock,* Amer. Math. Soc., Providence, 1994.

[6] V. I. Gurariy, *Subspaces and bases in spaces of continuous functions (Russian),* Dokl. Akad. Nauk SSSR **167** (1966), 971–973.

[7] V. I. Gurariy, *Linear spaces composed of nondifferentiable functions,* C. R. Acad. Bulgare Sci. **44** (1911), 4, 13–16.

[8] S. Hencl, *Isometrical embeddings of separable Banach spaces into the set of nowhere approximatively differentiable and nowhere Hölder functions,* Proc. Amer. Math. Soc. **128** (2000), 12, 3505–3511.

[9] L. Rodriguez-Piazza, *Every separable Banach space is isometric to a space of continuous nowhere differentiable functions,* Proc. Amer. Math. Soc. **123** (1995) 3649–3654.