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Corrigendum

Corrigendum to “Approximation by C^p-smooth, Lipschitz functions on Banach spaces” [J. Math. Anal. Appl. 315 (2006) 599–605]

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There is a gap in the proof of Theorem 1. Specifically, the estimate for $\sup_{x\in E_n} \|\bar{f}_n'(x) - F_n'(x)\|$ does not hold (as the inductive proof fails here), and as a consequence the conclusion of Theorem 1 does not follow. Nevertheless, using a construction from [2], techniques from [1], and employing a proof similar to that used originally, we are able to recover the results under the additional assumption that the subset $Y \subset X$ is convex (see Theorem 1 below). For full details of the proof, we refer the reader to http://www.tru.ca/advtech/faculty/Robb_Fry.html, or via e-mail request (rfry@tru.ca).

Theorem 1. *If X is a Banach space with an unconditional basis and admits a C^p-smooth, Lipschitz bump function, and Y is a convex subset of X, then any uniformly continuous function $f : Y \to \mathbb{R}$ can be uniformly approximated by Lipschitz, C^p-smooth functions $K : X \to \mathbb{R}$.*

Also, if Z is any Banach space, $Y \subset X$ is any subset, and $f : X \to Z$ (respectively $f : Y \to \mathbb{R}$) is Lipschitz with constant η, then we can choose $K : X \to Z$ (respectively $K : X \to \mathbb{R}$) to have Lipschitz constant no larger than $C_0\eta$, where $C_0 > 1$ is a constant depending only on X and the basis constant (in particular, C_0 is independent of ε).

References

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