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Aequationes Mathematicae

Correction

Correction to: There is at most one continuous invariant mean

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Abstract. A mistake in the formulation of Lemma 1 has been corrected. A preliminary section to the proof of Theorem 1 is added.

Mathematics Subject Classification. Primary 26E60; Secondary 39B12, 39B22.

Keywords. Invariant mean, Noncontinuous mean, Gaussian product, Mean-type mapping, Unique continuous solution.

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In the original article (published by P. Pasteczka) there is a mistake (observed by Árpád Száz) in the proof of Lemma 1. In fact, the statement is false in its original form, as it is demonstrated by the following counterexample: Let $D = [0, +\infty[\times[0, +\infty[$ with the standard topology,

$$F(x_1, x_2) = x_1 x_2 \qquad ((x_1, x_2) \in D),$$
$$T(s) = [0, +\infty[\times[0, s] \quad (s \in [0, +\infty[\,).$$

Then $\vec{F} \circ T(0) = \{0\}$ and $\vec{F} \circ T(s) = [0, +\infty[$ for every $s \in]0, +\infty[$.

However, in Theorem 1 it is sufficient to use the lemma for the restricted case when $D = I^p$ (with the standard topology), where $p \in \mathbb{N}$ and $I \subset \mathbb{R}$ is a compact interval. The proper formulation should be

The original article can be found online at https://doi.org/10.1007/s00010-022-00870-w.
The authors are grateful to Árpád Száz for finding the mistake in the original note, and his inspiration to writing this correction.

Lemma 1. *Let D be a* **compact, metrizable** *topological space and $F\colon D \to [0,\infty)$ be a continuous function.*

If $T\colon [0,\infty) \to 2^D$ is nondecreasing, right-continuous (we consider topological limit on 2^D) and such that

- *each $T(x)$ is closed;*
- *$\vec{F} \circ T\colon [0,\infty) \to 2^{[0,\infty)}$ is left-continuous.*

Then $\vec{F} \circ T$ is constant.

Then the following modification is required in the proof:
Instead of:

However, as D is σ-compact, we obtain that D_0 is compact.

There should be:

However D_0 is compact being a closed subset of a compact set.

As the result of this improvement, the proof of Theorem 1 should start with: *Starting section of the proof:* If there exist two different $\mathbf{M}$-invariant means $K_1, K_2\colon I^p \to I$, then there exist a compact subset $J \subseteq I$ and a vector $v \in J^p$ such that $K_1(v) \neq K_2(v)$. However $K_i|_{J^p}$ is invariant with respect to $\mathbf{M}|_{J^p}\colon J^p \to J^p$ for $i \in \{1,2\}$. Thus we can assume without loss of generality that I is a compact set.

Moreover in line 26, page 836, the following sentence should be added:

For the converse implication take any element $y \in \vec{F} \circ T(a)$. **Obviously** $0 \in F \circ T(a^-)$, **thus we can assume that** $y \neq 0$. Then, there exists...

More details related to this issue can be found in [5].

Reference

[5] Boros Z., Lovas R. L., Száz Á.: Some Relational and Sequential Results, and a True Relational Modification of a False Lemma of Paweł Pasteczka on the Constancy of the Composition of Certain Set-Valued Functions. Submitted

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