



## 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 Szász) 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,

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

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

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The original article can be found online at <https://doi.org/10.1007/s00010-022-00870-w>. The authors are grateful to Árpád Szász 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  $F: D \rightarrow [0, \infty)$  be a continuous function.*

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

- *each  $T(x)$  is closed;*
- *$\vec{F} \circ T: [0, \infty) \rightarrow 2^{[0, \infty)}$  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  $\sigma$ -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  $K_1, K_2: I^p \rightarrow I$ , 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  $\mathbf{M}|_{J^p}: J^p \rightarrow J^p$  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].

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## 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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