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Errata to the paper "A characterization of locally compact fields of zero characteristic" Fundamenta Mathematicae 76 (1972), pp. 149-155

by

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The purpose of the present note is to correct the statement "It is well known (see [8], [10]) that the only full, locally bounded non-trivial topologies on a field are topologies of type V...". This theorem was not proved in the paper. This fact was pointed out by Prof. Seth Warner. I wish to thank Prof. S. Warner for his comments. In connection with it some changes should be done in the paper. The above mentioned sentence should be omitted (pp. 149^{12}–149^{15}, 150^{8}–150^{11}, 151^{15}–151^{17}). The sentence "Let us remark that the topology $\mathcal{T}$ is induced in L by a non-Archimedean valuation..." (pp. 150_{4}–150_{1}, 151^{1}–151^{5}) should be read as: "Let us remark that the topology $\mathcal{T}$ is induced in L by a non-Archimedean pseudovaluation (cf. P. M. Cohn, *An invariant characterization of pseudovaluations on a field*, Proc. Cambridge Phil. Soc. 50 (1954), pp. 159–177). Indeed, since $Q_p \subset L$ topologically and $p^n \to 0$ in $\mathcal{T}$ as $n \to \infty$, the set T of all topological nilpotents in L is non-void, whence open and bounded (since $\mathcal{T}$ is locally bounded) as it follows from Theorem 6.1′ (loc. cit.). Let us denote this pseudovaluation by $|a|$. We have

$$|\varepsilon t| \leqslant |\varepsilon||t| = |\varepsilon|_p|t| = |t| = |\varepsilon^{-1}(\varepsilon t)| \leqslant |\varepsilon^{-1}||\varepsilon t|$$
$$= |\varepsilon^{-1}|_p|\varepsilon t| = |\varepsilon t|, \ |\varepsilon t| = |t| .$$

Since $|a|$ is a non-Archimedean pseudovaluation, so $|\varphi_\varepsilon(a)| = |a|$ for every $a \in Q_p(t)$."

Lemma 2 should be replaced by the following

LEMMA 2′. *Let E be a separable algebraic extension of F. Moreover, if E is a pseudovaluated extension of a real-valued field F, E and F both being complete, and the pseudovaluation of E extends the norm of F, then E is a finite extension of F, i.e. $[E: F] < \infty$.*

Instead of A. Ostrowski [12] there should be: I. Kaplansky, *Topological methods in valuation theory*, Duke Math. Journal, 14 (1947), pp. 527–541 (Th. 9).

Finally, the proof of Lemma 3 should begin as follows: "Since $\mathfrak{T}$ is a locally bounded field topology, $F(x)$ has an order R, equivalent to $F[x]$ (cf. D. Zelinsky, *Rings with ideal nuclei*, Duke Math. Journal 18 (1951), pp. 431–442, proof of Theorem 9). From the Lemma 1 it follows now that $\mathfrak{T}$ is induced by a valuation."

The remainder of the proof is not changed.

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