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A REMARK ON A PAPER OF V.K. SRINIVASAN

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An associative locally finite algebra which is also an integral domain over an algebraically closed field is isomorphic to the ground field.

In his paper [1], Srinivasan stated the following "Gelfand-Mazur like theorem":

A complex Banach algebra which is locally finite, and which is also an integral domain, is isomorphic to the complex field $\mathbb{C}$.

This theorem is valid for each associative, locally finite algebra A , which is also an integral domain, over an algebraically closed field K .

This is shown by the following elementary *proof*. Let a be an element of A . Since A is locally finite, the subalgebra B of A generated by a and the unit element $1 \in A$ is a finite dimensional vector space over K . Because A is without zero divisors, for each element $b \in B$, $b \neq 0$, the linear map $B \to B$, $x \to bx$, is injective; thus bijective too, since B is finite dimensional. Therefore B is a field and a finite extension of the algebraically closed field K , hence isomorphic to K . Consequently one can find an element $\alpha \in K$ with $a = \alpha 1$, and A is isomorphic to K .

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Reference

[1] V.R. Srinivasan, "On some Gelfand-Mazur like theorems in Banach algebras", *Bull. Austral. Math. Soc.* 20 (1979), 211-215.

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