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local field

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A *local field* is a topological field which is Hausdorff and locally compact as a topological space.

Examples of local fields include:

- Any field together with the discrete topology.
- The field \mathbb{R} of real numbers.
- The field \mathbb{C} of complex numbers.
- The field \mathbb{Q}_p of <http://planetmath.org/PAdicIntegers> p -adic rationals, or any finite extension thereof.
- The field $\mathbb{F}_q((t))$ of formal Laurent series in one variable t with coefficients in the finite field \mathbb{F}_q of q elements.

In fact, this list is complete—every local field is isomorphic as a topological field to one of the above fields.

1 Acknowledgements

This document is dedicated to those who made it all the way through Serre’s book [?] before realizing that nowhere within the book is there a definition of the term “local field.”

References

- [1] Jean–Pierre Serre, *Local Fields*, Springer–Verlag, 1979 (GTM **67**).