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Schauder fixed point theorem

Canonical name	SchauderFixedPointTheorem
Date of creation	2013-03-22 13:45:17
Last modified on	2013-03-22 13:45:17
Owner	paolini (1187)
Last modified by	paolini (1187)
Numerical id	12
Author	paolini (1187)
Entry type	Theorem
Classification	msc 54H25
Classification	msc 47H10
Classification	msc 46B50
Related topic	BrouwerFixedPointTheorem
Related topic	FixedPoint
Related topic	TychonoffFixedPointTheorem

Let X be a normed vector space, and let $K \subset X$ be a non-empty, compact, and convex set. Then given any continuous mapping $f: K \rightarrow K$ there exists $x \in K$ such that $f(x) = x$.

Notice that the unit disc of a finite dimensional vector space is always convex and compact hence this theorem extends Brouwer Fixed Point Theorem.

Notice that the space X is not required to be complete, however the subset K being compact, is complete with respect to the metric induced by X .

References

- [1] Rudin, *Functional Analysis*, Chapter 5.