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products of connected spaces are connected

Canonical name	ProductsOfConnectedSpacesAreConnected
Date of creation	2013-03-22 13:56:13
Last modified on	2013-03-22 13:56:13
Owner	mps (409)
Last modified by	mps (409)
Numerical id	6
Author	mps (409)
Entry type	Theorem
Classification	msc 54D05

Theorem 1 *[?, ?] Let $(X_i)_{i \in I}$ be a family of topological spaces. Then the product space*

$$\prod_{i \in I} X_i$$

with the product topology is connected if and only if each space X_i is connected.

As is true of most results in topology involving products, the forward implication requires the axiom of choice.

References

[1] S. Lang, *Analysis II*, Addison-Wesley Publishing Company Inc., 1969.

[2] A. Mukherjea, K. Pothoven, *Real and Functional Analysis*, Plenum Press, 1978.