

FINITE ORDER ISOMORPHISMS OF SPACES OF SMOOTH FUNCTIONS PRESERVE DIMENSION

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ABSTRACT. Let M and N be compact smooth manifolds and $C^\infty(M)$ and $C^\infty(N)$ the vector spaces of smooth real-valued functions on M and N with the usual Fréchet topology. If $C^\infty(M)$ and $C^\infty(N)$ are isomorphic as Fréchet spaces via an operator of finite order whose inverse also has finite order, then $\dim M = \dim N$. We provide counterexamples that the previous conclusion is false if the isomorphism or its inverse is not of finite order.

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