ON SIMPLY-CONNECTED DOMAINS WITH CONNECTED PREIMAGE

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We consider the following straightforward question: does there exist a transcendental entire function f, and two disjoint simply-connected domains U and V , such that $f^1(U)$ and $f^1(V)$ are both connected? The answer is surprising, and contrary to a series of published proofs, dating back to 1970. As well as answering this question, we discuss the error in these proofs, and the dynamical questions that are reopened