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ANTIDERIVATIVES OF BAIRE FUNCTIONS

Recall that a function $f : \mathbb{R} \to \mathbb{R}$ is called a Baire function if and only if $f^{-1}(U)$ can be expressed as the symmetric difference of some open set and some meager set for each open set U. We show that for each Baire function f (even one taking on the values $+\infty$ or $-\infty$), there is an absolutely continuous function F and a meager set M such that for each $x \in \mathbb{R} \setminus M$, the derivative $F'(x)$ exists and equals $f(x)$.