An alternative equation for generalized monomials involving measure

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Abstract. In this paper, we consider a generalized monomial $f : \mathbb{R} \to \mathbb{R}$ that satisfies the additional equation $f(x)f(y) = 0$ for the pairs $(x, y) \in D$, where $D \subset \mathbb{R}^2$ has a positive planar Lebesgue measure. We prove that $f(x) = 0$ for all $x \in \mathbb{R}$. Using analogous arguments, we establish a related statement about the signs of such functions: if a generalized monomial f of an even degree is non-negative on a measurable subset of reals with positive Lebesgue measure, then $f(x) \geq 0$ for every real number x. Finally, we extend our results to almost monomial functions.

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