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Investigating derivatives by means of combinatorial analysis of the components of the function.

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Summary: Given a composite function of the form $h(x) = f(g(x))$, difficulties are often encountered in calculating the value of the n th derivative at some point $x = x_0$ when one attempts to determine whether its n th derivative becomes zero at this point, or attempts to find the sign of the n th derivative by differentiating it n times and substituting x_0 . This present paper offers an alternative method that allows the investigation of the n th derivative of function $h(x)$ based on the investigation of functions $f(x)$ and $g(x)$ only. Several examples are given, which implement the conclusions on the properties of the relation.

Classification: I45

Keywords: properties of high-order derivatives; zeroing of derivatives; composite functions

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