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Multivariable Faa di Bruno formulas.

Bogacki, Przemyslaw (ed.) et al., Proceedings of the 9th annual international conference on technology in collegiate mathematics, ICTCM 9, Reno, NV, USA, November 7–10, 1996. Norfolk, VA: Old Dominion University, Dept. of Mathematics and Statistics (ISBN 0-201-34312-6). Electronic paper (1996).

The Bruno product for multiple integer sequences is key to the combinatorial Faa di Bruno formula for the univariate higher-order chain rule derived in 1850 (It can be found in some European calculus text books). This extremely useful formula (in statistics and physics) is normally restricted to derivatives of order four. For multivariate statistics and solid (or fluid) mechanics, composite derivative problems in two, three, or four variables are quite normal, and sometimes appear in undergraduate contexts. Master's degree students are often exposed to multivariable problems involving second, third, or even fourth-order partial derivatives of composite functions. Mistakes and omissions are frequent when the ordinary first-order chain rule is iteratively applied. (author's abstract) (available under <http://archives.math.utk.edu/ICTCM/EP-9.html>)

Classification: I65

Keywords: higher-order chain rule; multivariable calculus