

Maclaurin's Theorem Encyclopedia Article

Maclaurin's Theorem

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Maclaurin's Theorem

Maclaurin's **theorem** is a specific form of Taylor's theorem, or a Taylor's **power series** expansion, where $c = 0$ and is a series expansion of a function about **zero**. The basic form of Taylor's theorem is: $\sum_{n=0}^{\infty} (f^{(n)}(c)/n!)(x - c)^n$. When the appropriate substitutions are made Maclaurin's theorem is: $f(x) = f(0) + f'(0)x + f''(0)x^2/2! + f^{(3)}(0)x^3/3! + \dots + f^{(n)}(0)x^n/n! + \dots$. The Taylor's theorem provides a way of determining those values of x for which the Taylor series of a function f converges to $f(x)$.

In 1742 Scottish mathematician **Colin Maclaurin** attempted to put **calculus** on a rigorous geometric basis as well as give many applications of calculus in the work. It was the first logical and systematic exposition of the method of **fluxions** and originated as a reply to Berkeley's attack on Newton's methods of calculus. In this text, among several other monumental ideas, Maclaurin gave a **proof** of the theorem that today holds his name, Maclaurin's theorem, and is a special case of Taylor's theorem. He obtained this theorem by assuming that $f(x)$ can be expanded in a power series form and then, upon differentiation and substituting $x = 0$ in the results, the values of the coefficients of each term can be obtained. He did this but did not investigate the convergency of the series at that time. Although this theorem holds Maclaurin's name it was previously published by another Scottish mathematician, **James Stirling**, in his book *Methodus Differentialis* published in 1730. It is no doubt but that this theorem is what Maclaurin is best remembered.