Differentiating Algebraic Functions Encyclopedia Article

Differentiating Algebraic Functions

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Differentiating Algebraic Functions

Differentiation of algebraic **functions** works by one of the simplest rules in **calculus**. Each component of the algebraic function is differentiated separately, and then the differentials are added together. If the components of the algebraic function are the **variable** taken to different **powers** and multiplied by coefficients, the process is even easier.

First, the power of the variable is decreased by one, so that if the original power is x^3, the result contains a power of x^2. Then, the original power of the variable is multiplied by the coefficient of the term for the new coefficient. In this manner, $5x^4$ becomes $20x^3$ when differentiated once. Constant terms, of course, disappear.

Each of these rules has a specific name, within calculus. The rule that a constant's derivative is **zero** is, of course, the constant derivative rule. The power rule for positive integer powers of x states that, when taking a derivative of a function of a positive integer power of x, the power of the variable is decreased by one and the function is multiplied by the original power. The constant multiple rule simply affirms that the derivative of a constant times a function is the same as the constant times the derivative of the function. Finally, the sum and difference rule states that the derivatives of **sums and differences** of algebraic terms are the same as the sums and differences of the derivatives.

The differentiation of algebraic functions is probably one of the most used skills in calculus. Many rate of change problems occur at linear rates, and still more can be expressed in terms of algebraic functions. Since calculus is largely the study of rates of change, this skill and information become particularly useful.