Five derivative rules for operations on functions.

Constant Multiple Rule: $\frac{d}{dx}\left[cf(x)\right] = cf'(x)$

Sum and Difference Rule: $\frac{d}{dx}\left[f(x) \pm g(x)\right] = f'(x) \pm g'(x)$

Product Rule: $\frac{d}{dx}\left[f(x) \cdot g(x)\right] = f'(x)g(x) + f(x)g'(x)$

Quotient Rule: $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$

Chain Rule: $\frac{d}{dx}\left[f(g(x))\right] = f'(g(x)) \cdot g'(x)$

Ten derivative rules for functions

Derivative of a Constant: $\frac{d}{dx}\left[c\right] = 0$, where c is a constant.

The Power Rule: $\frac{d}{dx}\left[x^n\right] = nx^{n-1}$

Exponential Functions: General Case: $\frac{d}{dx}\left[a^x\right] = a^x \cdot \ln(a)$

Exponential Functions: Special Case: $\frac{d}{dx}\left[e^x\right] = e^x$

Three Trigonometric Rules. $\frac{d}{dx}\left[\sin(x)\right] = \cos(x)$

$\frac{d}{dx}\left[\cos(x)\right] = -\sin(x)$

$\frac{d}{dx}\left[\tan(x)\right] = \sec^2(x) = \frac{1}{\cos^2(x)}$

Three Inverse Function Rules

$\frac{d}{dx}\left[\ln(x)\right] = \frac{1}{x}$

$\frac{d}{dx}\left[\arctan(x)\right] = \frac{1}{1+x^2}$

$\frac{d}{dx}\left[\arcsin(x)\right] = \frac{1}{\sqrt{1-x^2}}$

General Antiderivative Rules

If k is a constant $\int k\,dx = kx + C$

$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$, when $n \neq -1$

$\int a^x\,dx = \frac{a^x}{\ln(a)} + C$

$\int e^x\,dx = e^x + C$

$\int \cos(x)\,dx = \sin(x) + C$

$\int \sin(x)\,dx = -\cos(x) + C$

$\int \sec^2(x)\,dx = \tan(x) + C$

$\int \frac{1}{x}\,dx = \ln(|x|) + C$

$\int \frac{1}{1+x^2}\,dx = \arctan(x) + C$

$\int \frac{1}{\sqrt{1-x^2}}\,dx = \arcsin(x) + C$