the sum rule

example

the sum rule

If f and g are differentiable, then

$$\frac{d}{dx}\big(f(x)+g(x)\big)=\frac{d}{dx}\big(f(x)\big)+\frac{d}{dx}\big(g(x)\big)=f'(x)+g'(x)$$

If you repeatedly apply the sum rule, you have

$$\frac{d}{dx}\big(f_1(x)+f_2(x)+\cdots+f_n(x)\big)=\frac{d}{dx}\big(f_1(x)\big)+\frac{d}{dx}\big(f_2(x)\big)+\cdots+\frac{d}{dx}\big(f_n(x)\big)$$

example

Differentiate the function $f(x)=3x^2+4x^3$.

$$\frac{d}{dx}\big(x^3+x^4\big)=\frac{d}{dx}\big(x^3\big)+\frac{d}{dx}\big(x^4\big)=3x^2+4x^3$$

a special case