Die Summenregel:

Es sei: $f(x) = g(x) + h(x)$

$$\frac{d}{dx} f(x) = \lim_{x \to x_0} \frac{f(x) - f(x_0)}{x - x_0}$$

$$\frac{d}{dx} f(x) = \lim_{x \to x_0} \frac{(g(x) + h(x)) - (g(x_0) + h(x_0))}{x - x_0}$$

$$\frac{d}{dx} f(x_0) = \lim_{x \to x_0} \frac{g(x) - g(x_0) + h(x) - h(x_0)}{x - x_0}$$

$$\frac{d}{dx} f(x_0) = \lim_{x \to x_0} \left(\frac{g(x) - g(x_0)}{x - x_0} + \frac{h(x) - h(x_0)}{x - x_0} \right)$$

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$$\frac{d}{dx} f(x_0) = \frac{d}{dx} g(x_0) + \frac{d}{dx} h(x_0)$$

$$f'(x_0) = g'(x_0) + h'(x_0)$$

Beweisen Sie die Faktorregel analog:

$f(x) = a \cdot g(x)$ mit a $\in$ R$\in$*, (= Konstante)

$$f'(x_0) = a \cdot g'(x_0)$$