iv) Quotientenregel:

$$f(x)=\frac{z(x)}{n(x)} \Rightarrow f'(x)=\frac{z'(x)\,n(x)-n'(x)\,z(x)}{n(x)^2}$$

Bsp: $f(x)=\frac{x^2-1}{x+1} \Rightarrow f'(x)=\frac{(x^2-1)'(x+1)-(x+1)'(x^2-1)}{(x+1)^2}$

$$\Rightarrow f'(x)=\frac{2x(x+1)-(x^2-1)}{(x+1)^2}$$

v) Kettenregel:

$$f(x)=\bar{a}(i(x)) \Rightarrow f'(x)=\bar{a}'(i(x))\cdot i'(x)$$

Äußere Mal innere Ableitung

Bsp.: $f(x)=(3x-4)^8 \rightarrow \bar{a}(i)=i^8$, $i(x)=3x-4$

$$f'(x)=8\underbrace{(3x-4)}_{i}^{7}\cdot 3$$

$$f(x)=e^{4x^2-3x+2} \rightarrow \bar{a}(i)=e^i,\ i(x)=4x^2-3x+2$$

(↳ exp( ))

$$f'(x)=e^{4x^2-3x+2}\cdot(8x-3)$$

Bsp: $f(x)=\sqrt{x^3+x^2+1} \rightarrow \bar{a}(i)=\sqrt{i}$, $i(x)=x^3+x^2+1$

$$f'(x)=\frac{1}{2}\frac{1}{\sqrt{x^3+x^2+1}}\cdot(3x^2+2x)$$

Bsp: $f(x)=\log(1+x^2) \Rightarrow \bar{a}(i)=\log(i)$, $i(x)=1+x^2$

$$f'(x)=10\cdot\frac{1}{1+x^2}\cdot 2x=\frac{20x}{1+x^2}$$

Physikalische Zusammenhänge:

$$s(t) \rightarrow s'(t) \rightarrow s''(t)$$
$$\Updownarrow \qquad \Updownarrow$$
$$v(t) \rightarrow v'(t)$$
$$\Updownarrow$$
$$a(t)$$
