Hand-Out Lösungen M7D

n) $\frac{d}{dx} 3\cdot\sin(5x-2) = 15\cdot\cos(5x-2)$

o) $\frac{d}{dx}\frac{1-x}{1+x} = \frac{-1}{1+x} - \frac{(1-x)}{(1+x)^2} = -1\cdot\frac{1+x}{(1+x)^2} - \frac{1-x}{(1+x)^2} =$

$= \frac{-2}{(1+x)^2}$ logisch, denn $\frac{1-x}{1+x} = \frac{2-x-1}{1+x} =$

$= \frac{2}{1+x} - 1$.

p) $f'(x) = \ln\left(\frac{1-x}{1+x}\right) = \frac{1}{\frac{1-x}{1+x}}\cdot\frac{-2}{(1+x)^2} = \frac{1+x}{1-x}\cdot\frac{-2}{(1+x)^2} =$

$= -2\cdot\frac{1}{(1-x)(1+x)} = \frac{-2}{1-x^2} = \frac{2}{x^2-1}$

q) $\frac{d}{dx} xe^{-x} = e^{-x} - xe^{-x} = (1-x)e^{-x}$

II *dx* $f(x) = \arccos(x) \Rightarrow \cos(f(x)) = x$

Differenzieren: $-\sin(f(x))\cdot f'(x) = 1$

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

III $v(t) = -\frac{g}{\alpha}(1-e^{-\alpha t}) = -\frac{g}{\alpha} + \frac{g}{\alpha}e^{-\alpha t}$ (Korrektur "–")

$\Rightarrow \frac{dv}{dt} = +\frac{g}{\alpha}\cdot -\alpha e^{-\alpha t} = -ge^{-\alpha t}$

$\alpha\cdot v = -g + ge^{-\alpha t} \Rightarrow -g+\alpha v = -ge^{-\alpha t}$ $\Big\}$ $-g+\alpha v = \frac{dv}{dt}$

IV $F(x) = \sin^2(x) + \cos^2(x)$

$\frac{d}{dx}F(x) = 2\cdot\sin(x)\cdot\cos(x) + 2\cdot\cos(x)\cdot -\sin(x) = 0$

also konstant $\Rightarrow F(x) = F(0) = 0+1 = 1$. $\forall x$.

V $T'(-28) = \frac{2\cdot\pi\cdot 3{,}5}{365}\cdot\cos\left(\frac{2\cdot\pi\cdot -28}{365}\right) \cong 0{,}06\cdot 0{,}89 \cong 0{,}05$

also etwa $\frac{1}{20}$ einer Stunde $\longrightarrow$ 3 Minuten!