Hand-Out Aufgaben : Lösungen

(I) a) $\dfrac{d}{dx}\dfrac{1}{1+x} = \dfrac{-1}{(1+x)^2}$

b) $\dfrac{d}{dx}\dfrac{x}{1+x} = \dfrac{1}{1+x} - \dfrac{x}{(1+x)^2} = \dfrac{1+x}{(1+x)^2} - \dfrac{x}{(1+x)^2} = \dfrac{+1}{(1+x)^2}$

ist logisch denn $\dfrac{x}{1+x} = 1 - \dfrac{1}{1+x}$

c) $\dfrac{d}{dx} e^{2x+1} = 2 \cdot e^{2x+1}$

d) $\dfrac{d}{dx} e^x \cdot \sin(x) = e^x(\sin(x) + \cos(x))$

e) $\dfrac{d}{dx} \sqrt{1-x^2} = \dfrac{-x}{\sqrt{1-x^2}}$

f) $\dfrac{d}{dx} \tan(x) = \tan^2(x) + 1 = \dfrac{1}{\cos^2(x)}$

g) $\dfrac{d}{dx} 2^x = \ln 2 \cdot 2^x$

h) $\dfrac{d}{dx} e^{-x} = -e^{-x}$

i) $\dfrac{d}{dx} 3 \cdot (e^{-x} + 1) = \dfrac{d}{dx}(3e^{-x} + 3) = -3e^{-x}$

j) $\dfrac{d}{dx}\dfrac{e^x}{e^x + 1} = \dfrac{e^x}{e^x + 1} - \dfrac{e^x}{(e^x + 1)^2} \cdot e^x =$

$= \dfrac{e^x(e^x + 1)}{(e^x + 1)^2} - \dfrac{e^{2x}}{(e^x + 1)^2} = \dfrac{e^x}{(e^x + 1)^2}$

k) $\dfrac{d}{dx}(x-1)^3 = 3 \cdot (x-1)^2 \cdot 1 = 3 \cdot (x-1)^2$

l) $\dfrac{d}{dx}\left[(x-1)(x-2)\right] = 1 \cdot (x-2) + (x-1) \cdot 1 = x-1 + x-2$

$= 2x - 3$

m) $\dfrac{d}{dx} x^x = \dfrac{d}{dx} e^{x \cdot \ln(x)} = e^{x \cdot \ln(x)} \cdot \dfrac{d}{dx}(x\ln x) =$

$= x^x \cdot \left[\ln(x) + \dfrac{x}{x}\right] = x^x \cdot (\ln(x) + 1)$