

Exer. a) $D(x^2 e^x) = 2x \cdot e^x + x^2 \cdot e^x$

$D(f \cdot g) = f' \cdot g + f \cdot g'$

b) $D e^{5x} = e^{5x} \cdot 5 \leftarrow D(5x)$ (Potenzfunktion ableiten)

c) $D 5^x = D e^{\ln 5^x} = D e^{x \ln 5} = e^{x \ln 5} \cdot \ln 5 = e^{\ln 5^x} \cdot \ln 5 = 5^x \ln 5$

Merkmale

$D e^x = e^x$
 $D e^{f(x)} = e^{f(x)} \cdot f'(x)$
 $D a^x = a^x \ln a$

21.5 a) $D e^{\frac{x}{2}} = e^{\frac{x}{2}} \cdot \frac{1}{2}$

$(D \frac{x}{2} = D(\frac{1}{2}x) = \frac{1}{2})$

b) $D e^{\frac{1}{2}x^2} = e^{\frac{1}{2}x^2} \cdot x$

c) $D(\frac{1}{2}e^{x^2}) = \frac{1}{2} e^{x^2} \cdot 2x = x e^{x^2}$

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

21.6 a) $D(x e^x - 6) = 1 \cdot e^x + x \cdot e^x = e^x + x e^x$

$D \frac{f}{g} = \frac{f' \cdot g - f \cdot g'}{g^2}$

b) $D \frac{e^x}{5x} = \frac{e^x \cdot 5x - e^x \cdot 5}{(5x)^2} = \frac{5x e^x - 5 e^x}{25x^2} = \frac{5 e^x (x-1)}{25x^2} = \frac{e^x (x-1)}{5x^2}$

21.10 $f(x) = e^{2x} - x$

$f'(x) = e^{2x} \cdot 2 - 1 = 2e^{2x} - 1 = 2$

$\Rightarrow 2e^{2x} = 3 \quad | :2$

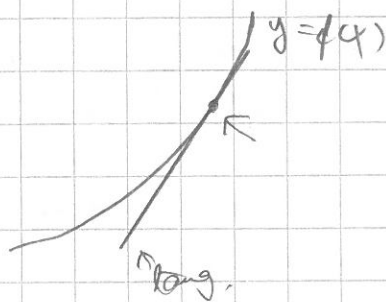
$\Rightarrow e^{2x} = \frac{3}{2} \quad | \ln$

$\Rightarrow \ln e^{2x} = \ln \frac{3}{2}$

$\Rightarrow 2x = \ln \frac{3}{2} \quad | :2 \Rightarrow x = \frac{\ln \frac{3}{2}}{2}$

$f(\frac{\ln \frac{3}{2}}{2}) = e^{2 \cdot \frac{\ln \frac{3}{2}}{2}} - \frac{\ln \frac{3}{2}}{2} = e^{\ln \frac{3}{2}} - \frac{\ln \frac{3}{2}}{2} = \frac{3}{2} - \frac{\ln \frac{3}{2}}{2}$

Wert $(\frac{\ln \frac{3}{2}}{2}, \frac{3}{2} - \frac{\ln \frac{3}{2}}{2})$



21.17 a) $\ln 6 - 2 \ln 3 + \ln \frac{1}{2}$

$= \ln 6 - \ln 3^2 + \ln \frac{1}{2}$

$\log a^n = n \log a$

$\log(a \cdot b) = \log a + \log b$

$\log \frac{a}{b} = \log a - \log b$