

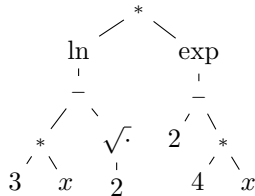


$$c) f'(x) = \left(\frac{\log_2(x)}{2^x} \right)' = \frac{\frac{1}{\ln(2)x} \cdot 2^x - \log_2(x) \cdot \ln(2) \cdot 2^x}{(2^x)^2} = \frac{2^x \left(\frac{1}{\ln(2)x} - \frac{\ln(x)}{\ln(2)} \cdot \ln(2) \right)}{(2^x)^2} = \frac{\frac{1}{\ln(2)x} - \ln(x)}{2^x}$$

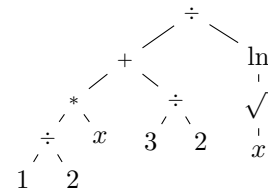
$$d) f'(x) = \left(\frac{e^x}{x^2} \right)' = \frac{e^x \cdot x^2 - e^x \cdot 2x}{(x^2)^2} = \frac{x \cdot e^x (x-2)}{x^4} = e^x \cdot \frac{x-2}{x^3}$$

✂ Lösung zu Aufgabe 19.24 ex-termbaueme-zeichnen

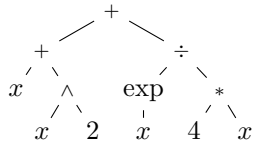
a) $\ln(3 \cdot x - \sqrt{2}) \cdot e^{2-4 \cdot x}$



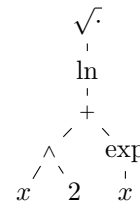
b) $\frac{\frac{1}{2} \cdot x + \frac{3}{2}}{\ln(\sqrt{x})}$



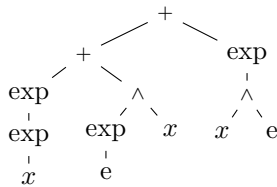
c) $x + x^2 + \frac{e^x}{4 \cdot x}$



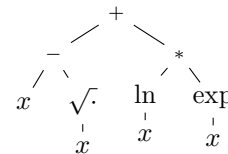
d) $\sqrt{\ln(x^2 + e^x)}$



e) $e^{e^x} + (e^e)^x + e^{x^e}$



f) $x - \sqrt{x} + \ln(x) \cdot e^x$



✂ Lösung zu Aufgabe 19.25 ex-dem-teufel-ein-ohr-ableiten

a) Kettenregel. Äussere Funktion: e^x , innere Funktion $2x$. Also $(e^{2x})' = e^{2x} \cdot 2$

b) Produktregel. $(x \cdot 2^x)' = 1 \cdot 2^x + x \cdot \ln(2) \cdot 2^x = 2^x(1 + \ln(2)x)$.

c) Quotientenregel. $\left(\frac{\ln(x)}{x} \right)' = \frac{\frac{1}{x} \cdot x - \ln(x) \cdot 1}{x^2} = \frac{1 - \ln(x)}{x^2}$

d) $\left(\frac{\sqrt{e^x}}{\ln(4x)} \right)' = \frac{\frac{1}{2\sqrt{e^x}} \cdot e^x \cdot \ln(4x) - \sqrt{e^x} \cdot \frac{1}{4x} \cdot 4}{(\ln(4x))^2} = \frac{\frac{1}{2} \cdot \sqrt{e^x} \ln(4x) - \sqrt{e^x} \cdot \frac{1}{x}}{(\ln(4x))^2}$

e) $(\ln(\sqrt{2^x}))' = \frac{1}{\sqrt{2^x}} \cdot \frac{1}{2\sqrt{2^x}} \cdot \ln(2) \cdot 2^x = \frac{\ln(2) \cdot 2^x}{2 \cdot 2^x} = \frac{\ln(2)}{2}$

Das könnte man auch billiger haben, indem man zuerst vereinfacht: $\ln(\sqrt{2^x}) = \ln(2^{\frac{x}{2}}) = \frac{x}{2} \cdot \ln(2) = x \cdot \frac{\ln(2)}{2}$.

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

✂ Lösung zu Aufgabe 19.26 ex-ableiten-bis-zum-abwinken

a) $f(x) = \frac{\sqrt{e^{-x} \cdot \ln(x)}}{x^2}$

$$f'(x) = \frac{\frac{1}{2\sqrt{e^{-x} \cdot \ln(x)}} \cdot \left(-e^{-x} \cdot \ln(x) + e^{-x} \cdot \frac{1}{x} \right) \cdot x^2 - \sqrt{e^{-x} \cdot \ln(x)} \cdot 2x}{x^4}$$