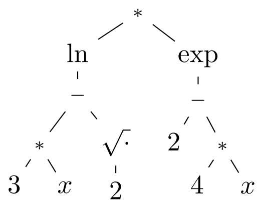
c) $f'(x) = \left(\frac{\log_2(x)}{2^x}\right)' = \frac{\frac{1}{\ln(2)x}\cdot 2^x - \log_2(x)\cdot\ln(2)\cdot 2^x}{(2^x)^2} = \frac{2^x\left(\frac{1}{\ln(2)x} - \frac{\ln(x)}{\ln(2)}\cdot\ln(2)\right)}{(2^x)^2} = \frac{\frac{1}{\ln(2)x} - \ln(x)}{2^x}$

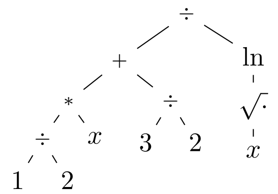
d) $f'(x) = \left(\frac{e^x}{x^2}\right)' = \frac{e^x\cdot x^2 - e^x\cdot 2x}{(x^2)^2} = \frac{x\cdot e^x(x-2)}{x^4} = e^x\cdot\frac{x-2}{x^3}$

Lösung zu Aufgabe 19.24 ex-termbaueme-zeichnen

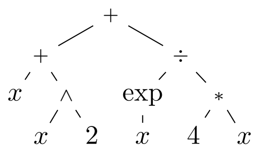
a) $\ln\left(3\cdot x - \sqrt{2}\right)\cdot e^{2-4\cdot x}$



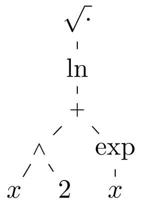
b) $\frac{\frac{1}{2}\cdot x + \frac{3}{2}}{\ln\left(\sqrt{x}\right)}$



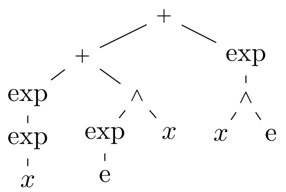
c) $x + x^2 + \frac{e^x}{4\cdot x}$



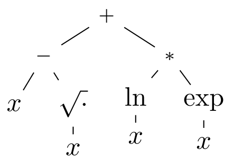
d) $\sqrt{\ln\left(x^2 + e^x\right)}$



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 $\left(e^{2x}\right)' = e^{2x}\cdot 2$

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) $\left(\ln\left(\sqrt{2^x}\right)\right)' = \frac{1}{\sqrt{2^x}}\cdot\frac{1}{2\sqrt{2^x}}\cdot\ln(2)\cdot 2^x = \frac{\ln(2)\cdot 2^x}{2\cdot 2^x} = \frac{\ln(2)}{2}$
Das könnte man auch billiger haben, indem man zuerst vereinfacht: $\ln\left(\sqrt{2^x}\right) = \ln\left(2^{\frac{x}{2}}\right) = \frac{x}{2}\cdot\ln(2) = x\cdot\frac{2}{\ln(2)}$.

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

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