Mathematik 7D

Zusatzübungen zum Differenzieren

Hier nochmal die wichtigsten Regeln fürs Differenzieren:

- $f(x) = x^n$, dann $f'(x) = nx^{n-1}$ (gilt für alle $n \neq 0$, sogar für reelle und rationale n
- $f(x) = e^x$, dann $f'(x) = e^x$
- $f(x) = \sin(x)$, dann $f'(x) = \cos(x)$
- $f(x) = \cos(x)$, dann $f'(x) = -\sin(x)$
- $f(x) = g(h(x))$, dann $f'(x) = g'(h(x)) \cdot h'(x)$
- $f(x) = g(x)h(x)$, dann $f'(x) = g'(x)h(x) + g(x)h'(x)$
- $f(x) = \frac{g(x)}{h(x)}$, dann $f'(x) = \frac{g'(x)h(x) - g(x)h'(x)}{h(x)^2}$
- $f(x) = kx + d$, dann $f'(x) = k$, auch wenn $k = 0$!
- $f(x) = \ln(x)$, dann $f'(x) = \frac{1}{x}$.
- $f(x) = \arcsin(x)$, dann $f'(x) = \frac{1}{\sqrt{1-x^2}}$
- $f(x) = \arccos(x)$, dann $f'(x) = \frac{-1}{\sqrt{1-x^2}}$
- $f(x) = \arctan(x)$, dann $f'(x) = \frac{1}{1+x^2}$

Differenziere folgende Funktionen

(a) $f(x) = \sin(x^2)$

(b) $f(x) = 2\sin(x)\cos(x)$

(c) $f(x) = 3\cos(x + \frac{\pi}{4})$

(d) $f(x) = x\sin(5x)$

(e) $f(x) = x^2\cos(x) + x\sin(x^2)$

(f) $f(x) = \sin(\sin(x))$

(g) $f(x) = \sin(x\sin(x))$

(h) $f(x) = e^{e^x}$

(i) $f(x) = 3x^2 e^{x+2x^2}$

(j) $f(x) = \frac{e^x+1}{e^x-1}$

(k) $f(x) = \frac{\sin(x)}{x}$

(l) $f(x) = \dfrac{xe^x}{x^2 + 1}$

(m) $f(x) = \arctan(x^2 + 1)$

(n) $f(x) = \sin(2\arcsin(x))$

(o) $f(x) = x^x = e^{x\ln(x)}$

(p) $f(x) = \ln(3x)$

(q) $f(x) = \ln(\frac{x-1}{x+1})$

(r) $f(x) = \ln(e^x + 1)$

(s) $f(x) = 3x^2 + \frac{x^3}{x^4 + 3x - 1}$

(t) $f(x) = \frac{\sin(x)+3}{\cos(3x)+5}$

(u) $f(x) = e^{3\sin(2x)}$

(v) $f(x) = (x^3 - 1)(x^4 - 16)$

(w) $f(x) = x\tan(x)$

(x) $f(x) = x\ln(x) - x$

(y) $f(x) = \dfrac{e^{-\frac{x^2}{2a^2}}}{\sqrt{2\pi a^2}}, \qquad a \in \mathbb{R}$

(z) $f(x) = e^{-\frac{3}{x^2}}$

(ω) $f(x) = \frac{3+x}{\sqrt{x}}$