

Lösungen zu den Übungen zur Quotientenregel

1. $f(x) = \frac{2x}{x^2+4}$	$f'(x) = \frac{2 \cdot (x^2+4) - 2x \cdot 2x}{(x^2+4)^2} = \frac{2x^2+8-4x^2}{(x^2+4)^2} = \frac{-2x^2+8}{(x^2+4)^2}$
2. $f(x) = \frac{2x^3-8}{x^4+6}$	$f'(x) = \frac{6x^2 \cdot (x^4+6) - (2x^3-8) \cdot 4x^3}{(x^4+6)^2} = \frac{6x^6+36x^2-(8x^6-32x^3)}{(x^4+6)^2}$ $= \frac{6x^6+36x^2-8x^6+32x^3}{(x^4+6)^2} = \frac{-2x^6+32x^3+36x^2}{(x^4+6)^2}$
3. $f(x) = \frac{10-4x^2}{x^2+7}$	$f'(x) = \frac{-8x \cdot (x^2+7) - (10-4x^2) \cdot 2x}{(x^2+7)^2} = \frac{-8x^3-56x-(20x-8x^3)}{(x^2+7)^2}$ $= \frac{-8x^3-56x-20x+8x^3}{(x^2+7)^2} = \frac{-76x}{(x^2+7)^2}$
4. $f(x) = \frac{x^5-12x}{2x^2+1}$	$f'(x) = \frac{(5x^4-12) \cdot (2x^2+1) - (x^5-12x) \cdot 4x}{(2x^2+1)^2} = \frac{(10x^6+5x^4-24x^2-12)-(4x^6-48x^2)}{(2x^2+1)^2}$ $= \frac{10x^6+5x^4-24x^2-12-4x^6+48x^2}{(2x^2+1)^2} = \frac{6x^6+5x^4+24x^2-12}{(2x^2+1)^2}$
5. $f(x) = \frac{x^5+4x^3}{e^x}$	$f'(x) = \frac{(5x^4+12x^2) \cdot e^x - (x^5+4x^3) \cdot e^x}{(e^x)^2} = \frac{(5x^4+12x^2) - (x^5+4x^3)}{e^x}$ $= \frac{5x^4+12x^2-x^5-4x^3}{e^x}$
6. $f(x) = \frac{2x-x^2}{e^{2x+6}}$	$f'(x) = \frac{(2-2x) \cdot e^{2x+6} - (2x-x^2) \cdot 2e^{2x+6}}{(e^{2x+6})^2} = \frac{(2-2x) - (2x-x^2) \cdot 2}{e^{2x+6}}$ $= \frac{2-2x-4x+2x^2}{e^{2x+6}} = \frac{2-6x+2x^2}{e^{2x+6}}$
7. $f(x) = \frac{\sin(x)}{x^6+4x^2}$	$f'(x) = \frac{\cos(x) \cdot (x^6+4x^2) - \sin(x) \cdot (6x^5+8x)}{(x^6+4x^2)^2}$
8. $f(x) = \frac{-5x+3}{\sqrt{x^2+1}}$	$f'(x) = \frac{(-5) \cdot (\sqrt{x^2+1}) - (-5x+3) \cdot \frac{1}{2} \cdot 2x \cdot (x^2+1)^{-\frac{1}{2}}}{(\sqrt{x^2+1})^2}$ $= \frac{(-5) \cdot (\sqrt{x^2+1}) - (-5x^2+3x) \cdot (x^2+1)^{-\frac{1}{2}}}{x^2+1}$
9. $f(x) = \frac{\cos(x)}{\sqrt{x+4}}$	$f'(x) = \frac{-\sin(x) \cdot (\sqrt{x+4}) - \cos(x) \cdot 0,5 \cdot x^{-\frac{1}{2}}}{(\sqrt{x+4})^2}$
10. $f(x) = \frac{\cos(2x)}{2e^{-4x+1}+4}$	$f'(x) = \frac{-2\sin(2x) \cdot (2e^{-4x+1}+4) - \cos(2x) \cdot (-8) \cdot e^{-4x+1}}{(2e^{-4x+1}+4)^2}$