

Bilde die Ableitungen

$$f(x) = 3x^3 + 4ax + 9 \quad f'(x) = 9x^2 + 4a \quad f''(x) = 18x \quad f'''(x) = 18$$

$$f(x) = \sin(9x^2) \quad f'(x) = 18x \cos(9x^2)$$

(Kettenregel)

$$f(x) = x^2 \ln(x) \quad f'(x) = 2x \ln(x) + x^2 \frac{1}{x} = x(2 \ln(x) + 1)$$

(Produktregel)

$$f(x) = -6x \cos(x) \quad f'(x) = -6 \cos(x) + 6x \sin(x)$$

(Produktregel)

$$f(x) = \frac{3x+4}{x^2} \quad f'(x) = \frac{3x^2 - (3x+4)2x}{x^4} = \frac{-3x^2 - 8x}{x^4} = \frac{-(3x+8)}{x^3}$$

(Quotientenregel)

$$f(x) = 5xe^x + 4x^3 \quad f'(x) = 5(e^x + xe^x) + 12x^2 = 5(x+1)e^x + 12x^2$$

(Produktregel + Summenregel)

$$f(x) = \frac{\sin(x)}{x^2} \quad f'(x) = \frac{x^2 \cos(x) - 2x \sin(x)}{x^4} = \frac{x \cos(x) - 2 \sin(x)}{x^3}$$

(Quotientenregel)

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

(Produktregel)

$$f(x) = x * 3^x \quad f'(x) = 3^x + x * 3^x * \ln(3) = 3^x(1 + x \ln(3))$$

(Produktregel)

$$f(x) = x * \cos(x^2) \quad f'(x) = \cos(x^2) - 2x^2 \sin(x^2)$$

(Produktregel + Kettenregel)

$$f(x) = 5x e^{ax+3} \quad f'(x) = 5e^{ax+3} + 5axe^{ax+3} = 5(1 + ax)e^{ax+3}$$

(Produktregel + Kettenregel)