

**Aufgabe 1**

a)  $f'(x) = 3x^2$

b)  $f'(x) = 10x^9$

c)  $f'(x) = 4x^3$

d)  $f'(x) = 3x^2 + 5x^4$

e)  $f'(x) = 11x^{10} + 10x^9$

f)  $f'(x) = 12x^3 + 35x^6$

g)  $f'(x) = 15x^4 - 14x$

h)  $f'(x) = 3x^2 + 12x^3$

i)  $f'(x) = 45x^8 + 12x^5 - 30x^2$

**Aufgabe 2**

a)  $f'(x) = 2ax + b$

b)  $f'(x) = a$

c)  $f'(x) = (c + 1) \cdot x^c$

d)  $f'(t) = 2t + 3$

e)  $f'(x) = 1$

f)  $f'(t) = -1$

**Aufgabe 3****a)**

$$\begin{aligned}f(x) &= x \cdot (5 - x) \\ &= 5x - x^2 \\ f'(x) &= 5 - 2x\end{aligned}$$

**b)**

$$\begin{aligned}f(x) &= (x + x^2) \cdot x \\ &= x^2 + x^3 \\ f'(x) &= 2x + 3x^2\end{aligned}$$

**c)**

$$\begin{aligned}f(x) &= x^2 \cdot (x + 2) \cdot 5 \\ &= 5x^2 \cdot (x + 2) \\ &= 5x^3 + 10x^2 \\ f'(x) &= 15x^2 + 20x\end{aligned}$$

**d)**

$$\begin{aligned}f(x) &= (x + 2)^2 \\ &= x^2 + 4x + 4 \\ f'(x) &= 2x + 4\end{aligned}$$

e)

$$\begin{aligned}f(x) &= 2 \cdot (x - 2)^2 \\ &= 2 \cdot (x^2 - 4x + 4) \\ &= 2x^2 - 8x + 8 \\ f'(x) &= 4x - 8\end{aligned}$$

f)

$$\begin{aligned}f(x) &= (x - 7)(x + 7) \\ &= x^2 - 49 \\ f'(x) &= 2x\end{aligned}$$

#### Aufgabe 4

$$\begin{aligned}f(x) &= 4x^2 + 7a^3 \\ f'(x) &= 8x\end{aligned}$$

$$\begin{aligned}f(r) &= 4rx^2 + 7a^3 \\ f'(r) &= 4x^2\end{aligned}$$

$$\begin{aligned}f(r) &= 4x^2 + 7a^3 \\ f'(r) &= 0\end{aligned}$$

$$\begin{aligned}f(a) &= 4a^2 + 7x^3 \\ f'(a) &= 8a\end{aligned}$$

$$\begin{aligned}f(a) &= x^8 + 8a \\ f'(a) &= 8\end{aligned}$$

$$f(a) = 4x^2 + 7a^3$$

$$f'(a) = 21a^2$$

$$f(x) = x^8 + 21a^2$$

$$f'(x) = 8x^7$$