1 Aufgaben

Gib die ersten zwei Ableitungen folgender Funktionen an:

a) $f(x) = \sin(x)$ b) $f(x) = 2\sin(x)$ c) $f(x) = \sin(2x)$

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

g) $f(x) = -2\cos(x)$ h) $f(x) = \cos(2x)$ i) $f(x) = \cos(x^2)$

2 Lösungen

a)

$$\begin{aligned} f(x) &= \sin(x) \\ f'(x) &= \cos(x) \\ f''(x) &= -\sin(x) \end{aligned}$$

b)

$$\begin{aligned} f(x) &= 2\sin(x) \\ f'(x) &= 2\cos(x) \\ f''(x) &= -2\sin(x) \end{aligned}$$

c)

$$\begin{aligned} f(x) &= \sin(2x) \\ f'(x) &= \cos(2x) \cdot (2x)' = 2\cos(2x) \\ f''(x) &= 2(\cos(2x)') = 2(-\sin(2x) \cdot (2x)') = -2\sin(2x) \cdot 2 = -4\sin(2x) \end{aligned}$$

d)

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

e)

$$\begin{aligned} f(x) &= \cos(x) \\ f'(x) &= -\sin(x) \\ f''(x) &= -\cos(x) \end{aligned}$$

f)

$$\begin{aligned} f(x) &= 2\cos(x) \\ f'(x) &= -2\sin(x) \\ f''(x) &= -2\cos(x) \end{aligned}$$

g)

$$\begin{aligned} f(x) &= -2\cos(x) \\ f'(x) &= 2\sin(x) \\ f''(x) &= 2\cos(x) \end{aligned}$$

h)

$$\begin{aligned} f(x) &= \cos(2x) \\ f'(x) &= -\sin(2x) \cdot (2x)' = -2\sin(2x) \\ f''(x) &= -2\cos(2x) \cdot (2x)' = -4\cos(2x) \end{aligned}$$

i)

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

Quelle: Ableitungen