

Ermitteln Sie die Steigung der Funktion $f(x) = \frac{3}{4}x^2 - 3x$ in dem Intervall $[2; 2.01]$.

$$m = \frac{f(2.01) - f(2)}{2.01 - 2}$$

$$m \approx \frac{-2.999 + 3}{0.01}$$

$$m \approx 0.1$$

Berechnen Sie die Ableitung der Funktion an der Stelle $x_0 = 2$.

a)

$$f(x) = x^2$$

$$m = \frac{f(2+h) - f(2)}{h}$$

$$m = \frac{(2+h)^2 - 4}{h}$$

$$m = \frac{(2 \cdot 2 + 2 \cdot h + h \cdot 2 + h \cdot h) - 4}{h}$$

$$m = \frac{4 + 4h + h^2 - 4}{h}$$

$$m = \frac{4h + h^2}{h}$$

$$m = \frac{(4+h)h}{h}$$

$$m = \lim_{h \rightarrow 0} (4 + h) = 4$$

b)

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

$$m = \frac{f(2+h) - f(2)}{h}$$

$$m = \frac{3(2+h)^2 - 12}{h}$$

$$m = \frac{3(2 \cdot 2 + 2 \cdot h + h \cdot 2 + h \cdot h) - 12}{h}$$

$$m = \frac{3(4 + 4h + h^2) - 12}{h}$$

$$m = \frac{12h + 3h^2}{h}$$

$$m = \frac{(12+3h)h}{h}$$

$$m = 12 + 3h$$

$$m = \lim_{h \rightarrow 0} (12 + 3h) = 12$$

c)

$$f(x) = -x^2$$

$$m = \frac{f(2+h) - f(2)}{h}$$

$$m = \frac{-(2+h)^2 - (-(2^2))}{h}$$

$$m = \frac{-(2 \cdot 2 + 2 \cdot h + h \cdot 2 + h \cdot h) + 4}{h}$$

$$m = \frac{-(4 + 4h + h^2) + 4}{h}$$

$$m = \frac{-4 - 4h - h^2 + 4}{h}$$

$$m = \frac{-4h - h^2}{h}$$

$$m = \frac{(-4-h)h}{h}$$

$$m = \lim_{h \rightarrow 0} (-4 - h) = -4$$

d)

$$f(x) = -\frac{1}{5}x^2 + 1$$

$$m = \frac{f(2+h) - f(2)}{h}$$

$$m = \frac{(-\frac{1}{5}(2+h)^2 + 1) - (-\frac{1}{5}(2)^2 + 1)}{h}$$

$$m = \frac{(-\frac{1}{5}(2 \cdot 2 + 2 \cdot h + h \cdot 2 + h \cdot h) + 1) - (-\frac{1}{5} \cdot 4 + 1)}{h} \quad m =$$

$$\frac{(-\frac{1}{5}(4 + 4h + h^2) + 1) - (-0.8 + 1)}{h}$$

$$m = \frac{(-0.8 - 0.8h - 0.8h^2 + 1) - 0.2}{h}$$

$$m = \frac{0.8h - 0.8h^2}{h}$$

$$m = (0.8 \cdot h - 0.8 \cdot h \cdot h)$$

$$m =$$