

S 19 Nr. 1

a)  $f(x) = x^2$  ;  $x_0 = 2$

$$m_2(h) = \frac{f(2+h) - f(2)}{h} \Rightarrow m_2(0,1) = \frac{f(2+0,1) - f(2)}{0,1} = \frac{2,1^2 - 2^2}{0,1} = \underline{\underline{4,1}}$$

$$m_2(10^{-6}) = \frac{(2+10^{-6})^2 - 2^2}{10^{-6}} = \underline{\underline{4,000\,001}} \quad \underline{\underline{f'(2) = 4}}$$

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b)  $f(x) = \frac{2}{x}$  ;  $x_0 = 2$

$$m_2(h) = \frac{f(2+h) - f(2)}{h} \Rightarrow m_2(0,1) = \frac{\frac{2}{2+0,1} - \frac{2}{2}}{0,1} \approx \underline{\underline{-0,476}}$$

$$m_2(10^{-6}) = \frac{\frac{2}{2+10^{-6}} - \frac{2}{2}}{10^{-6}} \approx \underline{\underline{-0,49999975}} \quad \underline{\underline{f'(2) = -0,5}}$$

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c)  $f(x) = 2x^2 - 3$  ,  $x_0 = 2$

$$m_2(h) = \frac{f(2+h) - f(2)}{h} \Rightarrow m_2(0,1) = \frac{2 \cdot (2+0,1)^2 - 3 - (2 \cdot 2^2 - 3)}{0,1} = 8,2$$

$$m_2(10^{-6}) = \frac{2 \cdot (2+10^{-6})^2 - 3 - (2 \cdot 2^2 - 3)}{10^{-6}} = \underline{\underline{8,000\,002}} \quad \underline{\underline{f'(2) = 8}}$$

für  $x_0 = 3$

$$\Rightarrow m_3(h) = \frac{f(3+h) - f(3)}{h} \Rightarrow m_3(0,1) = \frac{2 \cdot (3+0,1)^2 - 3 - (2 \cdot 3^2 - 3)}{0,1}$$

$$m_3(0,1) = \underline{\underline{12,2}}$$

$$m_3(10^{-6}) = \frac{2 \cdot (3+10^{-6})^2 - 3 - (2 \cdot 3^2 - 3)}{10^{-6}} = \underline{\underline{12,000\,002}} \quad \underline{\underline{f'(3) = 12}}$$

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d)  $f(x) = x^4 \Rightarrow f'(2) = \underline{\underline{32}}$  e)  $f(x) = x^3 \Rightarrow f'(2) = \underline{\underline{12}}$

f)  $f(x) = 4x - x^2 \Rightarrow f'(2) = \underline{\underline{0}}$  g)  $f(x) = \sqrt{x} \Rightarrow f'(2) \approx \underline{\underline{0,35}}$

h)  $f(x) = 5 \Rightarrow f'(2) = \underline{\underline{0}}$