

Abschnitt L.1

Mittlere Änderungsrate:

$$f(x) = x^3 + 1 \quad a) [2, 3] \quad b) [-1, 1]$$

$$\frac{\Delta y}{\Delta x} = \frac{28 - 9}{3 - 2} = \frac{19}{1} = \underline{\underline{19}}$$

Steigung einer Kurve:

$$y = x^2 - 2x - 3 \quad P_1(2, -3) \quad P_2(2+h, -3+h)$$

$$\frac{f(x_1+h) - f(x_1)}{h} = \frac{f(2+h) - f(2)}{h} = \frac{h^2 + 6h - 3 - (-3)}{h} = h+6$$

$$f(2+h) = (2+h)^2 - 2 \cdot (2+h) - 3 = 4 + 4h + h^2 - 4 - 2h - 3 = 6h + h^2 - 3 = h^2 + 6h - 3$$

$$f(2) = 4 - 4 - 3$$

$$\lim_{h \rightarrow 0} (h+6) = 6 + 0 = \underline{\underline{6}}$$

L.2

16

$$\lim_{x \rightarrow 0^-} f(x) g(x) = 5 \cdot -2 = -10$$

L.5

Stetigkeitstest

(3)

$$a) f(-1) = x^2 - 1 = 1 - 1 = 0 \rightarrow \exists a$$

$$b) \exists c$$

Aufgabe 2.6

a) 0 b) -2 c) 2 d) n.d. e) -1 f) ∞

g) n.d. h) 1 i) 0

3) $g(x) = \frac{1}{2x(1/x)}$

g) $\lim_{x \rightarrow \infty} \left(\frac{1}{2 + \frac{1}{x}} \right) = \frac{1}{2}$

11) $h(x) = \frac{-2x^3 - 2x + 3}{3x^3 + 3x^2 - 5x} = \frac{\cancel{-2x^3} - \cancel{2x} + \cancel{3}}{\cancel{3x^3} + \cancel{3x^2} - \cancel{5x}} = -\frac{2}{3}$

13) $\lim_{x \rightarrow -\infty} \left(\frac{1-x^3}{x^4+7x} \right)^c = \frac{\cancel{1} \overset{0}{\underset{\downarrow}{\cancel{x}}} - \cancel{x^3} \overset{-01}{\underset{\downarrow}{\cancel{-}}} 0}{\cancel{x^4} + \cancel{7x} \overset{0}{\underset{\downarrow}{\cancel{0}}}} = -(-1) = 1$

21) $\lim_{x \rightarrow 0^-} \left(\frac{2x}{x+8} \right) = \underbrace{\lim_{x \rightarrow 0^-} \left(\frac{1}{x+8} \right)}_{-\infty} \cdot \underbrace{\lim_{x \rightarrow 0^-} (2x)}_{-16} = -\infty$

Aufgabe 3.3

① $y = -x^2 + 3$ $y' = -2x$

② $s = 5t^3 - 3t^5$ $s' = 15t^2 - 15t^4$

③