Lösung Klausur 12-1 14.10.2009

A1 a) $f'(x) = (6x^2 - 7) \cdot \cos(2x^3 - 7x)$ 1

b) $g'(x) = 3 \cdot \cos x - (3x - 7) \cdot \sin x$ 1

c) $h'(x) = \frac{1}{3}(x^2 - 5x)^{-\frac{2}{3}} \cdot (2x - 5) = \frac{2x - 5}{3\sqrt[3]{(x^2 - 5x)^2}}$ 1

d) $i'(t) = \frac{2 \cdot \sin(at) - (2t + 1) \cdot a \cdot \cos(at)}{[\sin(a \cdot t)]^2}$ 1

Σ 4

A2 a) $f(x) = -x^3 + 3x + 2$

$f'(x) = -3x^2 + 3$

$f''(x) = -6x$

$f'''(x) = -6$

Extrema: $f'(x) = 0$ $x_1 = 1$ $f''(1) = -6$ • $H(1|4)$

$x_2 = -1$ $f''(-1) = 6$ • $T(-1|0)$

WA: $f''(x) = 0$ $x_3 = 0$ $f'''(0) = -6$ • $W(0|2)$

Schnittp.: • $S_y = W(0|2)$

• $N_1 = (-1|0) = P$ → Pol. div durch $(x+1)$

$(-x^3 + 0x^2 + 3x + 2) : (x + 1) = -x^2 + x + 2$

$-(-x^3 - x^2)$

$x^2 + 3x$

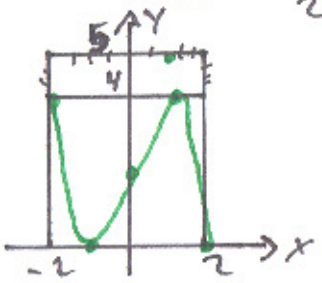
$-(x^2 + x)$

$2x + 2$

$x^2 - x - 2 = 0$

$x_{2,3} = 0{,}5 \pm \sqrt{2{,}25}$

$N_2 = N_1(-1|0)$ • $N_3(2|0)$



$f(-2) = 4$

K_1

Quadval

1

Σ 5

A3 $(x^5 + 4x^4 - 3x^3 - 22x^2 - 4x + 24) : (x^3 + 3x^2 - 4x - 12) = x^2 + x - 2$

$-(x^5 + 3x^4 - 4x^3 - 12x^2)$

$x^4 + x^3 - 10x^2 - 4x$

$-(x^4 + 3x^3 - 4x^2 - 12x + 24)$

$-2x^3 - 6x^2 + 8x + 24$

$-(-2x^3 - 6x^2 + 8x + 24)$

0

Σ

A4 a) $a_1 = 0{,}5$ $a_2 = 1{,}25$ $a_3 = 1{,}5$ $a_4 = \frac{13}{8} = 1{,}625$ 1

b) s.m.w. $a_{n+1} - a_n = \frac{4n + 1}{2n + 2} - \frac{4n - 3}{2n} = \frac{8n^2 + 2n - [8n^2 + 2n - 6]}{(2n + 2)(2n)} = \frac{6}{n + 1} > 0$

$\Rightarrow \{a_n\}$ s.m.w.

c) $\frac{4n - 3}{2n} \leq 2$ $4n - 3 \leq 4n$ $-3 \leq 0$ ⇒ $S = \mathbb{Z}$ 1

$\frac{4n - 3}{2n} \leq 2 - \varepsilon$ $4n - 3 \leq 4n - 2n\varepsilon$ $2n\varepsilon \leq 3$ $n \leq \frac{3}{2\varepsilon}$ 2

d) $\lim_{n \to \infty} \frac{4n - 3}{2n} = \lim_{n \to \infty} \frac{n(4 - \frac{3}{n})}{n \cdot 2} = 2$, weil $\frac{3}{n}$ Nullfolge 1

Σ