F12T6 1. SAM am 8.12.08

$$f_a(x) = \frac{x^2+ax-2a^2}{x-2} = \frac{(x+2a)(x-a)}{x-2}$$

1.1. Def. Lücke bei $x_0 = 2$ $\left[x^2+ax-2a^2=0 \Rightarrow x_{1/2} = \frac{-a \pm \sqrt{a^2+8a^2}}{2} \nearrow x_1 = -2a \searrow x_2 = a\right.$

2 i.A.: $x_1 = a$; $x_2 = -2a$; $x=2$ Pol 1. Ordn. 2 einf NST

(8)

2 1. SF: $a=0$: $x_{1/2} = 0$ 1 (do) NST $x=2$ Pol

2 2. SF: $a=2$: $x_1 = -4$ ✓ 1 (einf) NST, $x=2$ hebb. Lücke

2 2. SF: $a=-1$: $x_1 = -1$ ✓ 1 (einf) NST $x=2$ hebb. Lücke

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(3)

1.2 $\Delta x = x_2 - x_1 = a - (-2a) = 3a \stackrel{!}{=} 3 \Leftrightarrow a = 1$ / $x_1 - x_2 = -2a - a = -3a \stackrel{!}{=} 3 \Rightarrow a = -1$

1.3.1 $f(x) = \frac{x^2+x-2}{x-2}$: $(x^2+x-2):(x-2) = x+3+\frac{4}{x-2}$

$-(x^2-2x)$

$3x-2$

$-(3x-6)$

4

(4)

Schräge: $y = x+3$

Senkr. $x = 2$

1.3.2 $f'(x) = \frac{(x-2)(2x+1)-(x^2+x-2)\cdot 1}{(x-2)^2} = \frac{2x^2+x-4x-2-x^2-x+2}{(x-2)^2}$

(6)

$f'(x) = \frac{x^2-4x}{(x-2)^2} = \frac{x(x-4)}{(x-2)^2}$ ②

		0		2		4	
Z(x)	+	0	−	‖	−	0	+
N(x)	+	+	+	0	+	+	+
f'(x)	+	0	−	↯	−	0	+
			HOP			TIP	③

$f(0) = 1 \Rightarrow$ HOP (0|1)

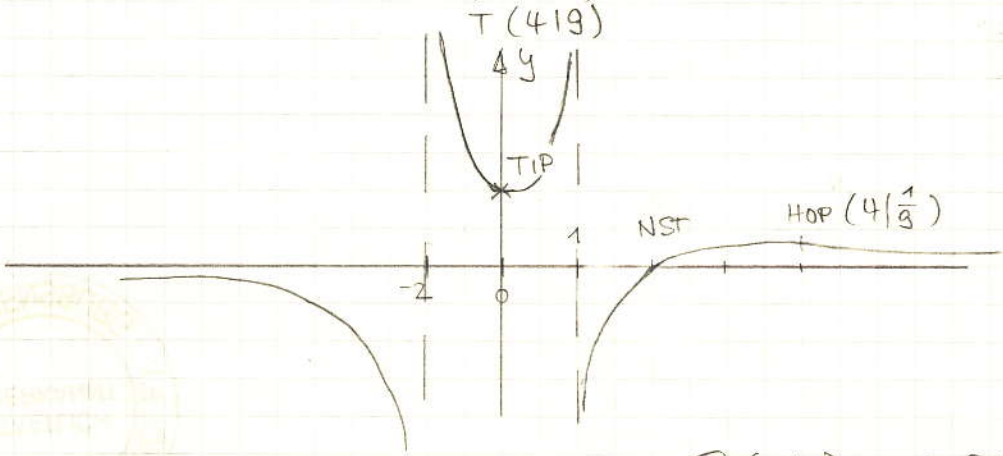
$f(4) = 9 \Rightarrow$ TIP (4|9) ①

1.4.1 $g(x) = \frac{1}{f(x)}$ f: $N_1(1|0)$; $N_2(-2|0)$; $x_0 = 2$ Pol

(6)

H (0|1)

T (4|9)



HOP : TIP v. G_f

TIP : HOP v. G_f

NST : NNST v. G_f

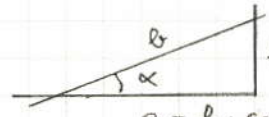
Pole : ZNST v. G_f

waagr. As. $y = 0$

G (0|1) weil $f(0) = 1$ und $g(0) = \frac{1}{1} = 1$ } gl.

F12T6 1. SAM am 9.12.08

2.1 $A = \frac{1}{2} gh = \frac{1}{2} b\cos(\alpha) \cdot b \sin(\alpha)$ ②



$h = b \cdot \sin\alpha$

$g = b \cdot \cos\alpha$

④ $A(\alpha) = \frac{1}{2} \cdot \sqrt{2}\sqrt{2} \cos(\alpha) \sin(\alpha)$

$A(\alpha) = \cos(\alpha) \sin(\alpha)$ ① ; $D_{max} = [0; 90°]$ ① $= [0; \frac{\pi}{2}]$

2.2 ① $A'(\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$; $\cos^2(\alpha) = 1 - \sin^2(\alpha)$ ①

⑥ ① $A'(\alpha) = 1 - \sin^2(\alpha) - \sin^2(\alpha) = 1 - 2\sin^2(\alpha)$

② $A'(\alpha) = 0 \Leftrightarrow 1 - 2\sin^2(\alpha) = 0 \Leftrightarrow \sin^2(\alpha) = \frac{1}{2} \Leftrightarrow \alpha = \arcsin(\pm\frac{1}{2}\sqrt{2})$

① $\alpha_1 = 45° \ (\hat{=} \frac{\pi}{4})$; $(\alpha_2 = -45° \ \hat{=} -\frac{\pi}{4} \quad n \notin D_{max})$

3

$$\begin{aligned} x_1 + 4x_2 &= 2 \\ 5x_1 + 18x_2 + kx_3 &= 11 \\ -x_1 - 6x_2 + k^2x_3 &= k-2 \end{aligned} \quad \begin{matrix} -5\cdot I \\ \\ +I \end{matrix} \quad \begin{matrix} 1 & 4 & 0 & 2 \\ 0 & -2 & k & 1 \\ 0 & -2 & k^2 & k \end{matrix} \ ② \quad \begin{matrix} \\ -II \\ \\ \end{matrix} \quad \begin{matrix} 1 & 4 & 0 & 2 \\ 0 & -2 & k & 1 \\ 0 & 0 & k^2-k & k-1 \end{matrix} \ ①$$

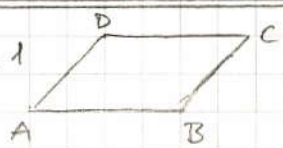
⑥

$k(k-1)x_3 = k-1$

1. Fall: $k = 0$: $0x_3 = -1$ ↯ k. Lsgen ①
2. Fall $k = 1$: $0x_3 = 0$ (w) ∞ viele Lsgen ①

sonst: $x_3 = \frac{1}{k}$ eindeutige Lsg. ①

4.1



$$\vec{d} = \vec{a} + \vec{BC} = \vec{a} + \vec{c} - \vec{b} = \begin{pmatrix} -5 \\ 1 \\ 0 \end{pmatrix} + \begin{pmatrix} -3 \\ 4 \\ 3 \end{pmatrix} - \begin{pmatrix} 3 \\ -6 \\ 10 \end{pmatrix} = \begin{pmatrix} -11 \\ 11 \\ 7 \end{pmatrix}$$

4.2

$$\vec{m}_{AB} = \frac{1}{2}(\vec{a} + \vec{b}) = \frac{1}{2}\left(\begin{pmatrix} -5 \\ 1 \\ 0 \end{pmatrix} + \begin{pmatrix} 3 \\ -6 \\ 10 \end{pmatrix}\right) = \begin{pmatrix} -1 \\ -2{,}5 \\ 5 \end{pmatrix} = \begin{pmatrix} -1 \\ t-2 \\ 5 \end{pmatrix} \Rightarrow -2{,}5 = t - 2 \Leftrightarrow t = -\frac{1}{2}$$

4.3 $t - 2 = 0 \Leftrightarrow t = 2$; $P_2(-1|0|5)$ ①

Gerade senkrecht ① zur x_1-x_3-Ebene durch $P(-1|0|5)$

parallel zur x_2-Achse ①