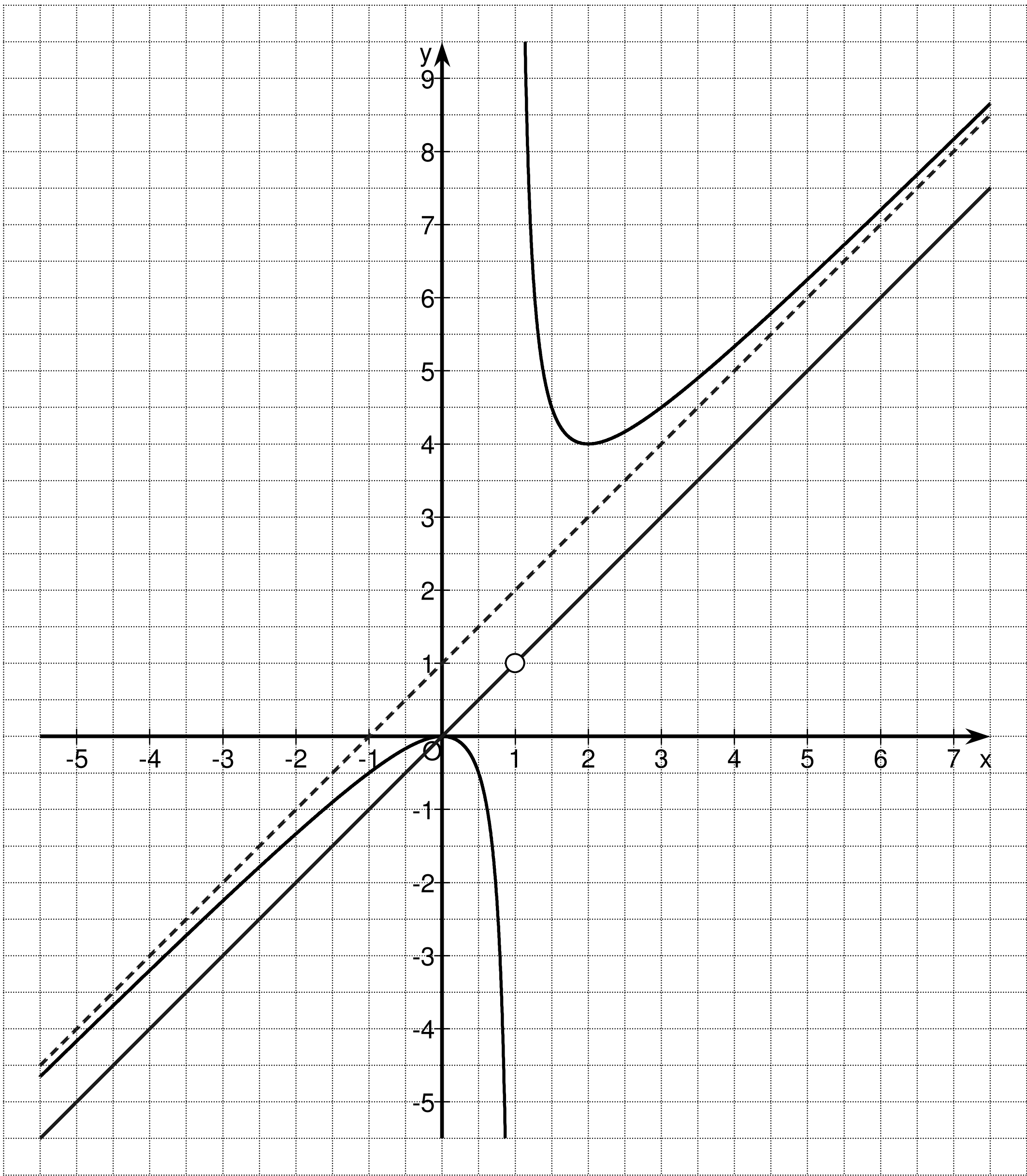
NP

Klasse B12T4

2. Schulaufgabe aus der Mathematik am 21.02.2013 Name ....

1.1	1.2	1.3	1.4	1.5.1	1.5.2	1.6.1	1.6.2	1.7.1	2.1	2.2	2.3	2.4.1	2.4.2	Σ
			X X X X											

Zu Aufgaben 1.1 und 1.5.2



B12T2 2. Schulaufgabe am 21.02.13

1.1 (4)

$x_N = 1$ in Z: $1 + k = 0 \Leftrightarrow \underline{k = -1}$; $f_{-1}(x) = \frac{x(x-1)}{x-1}$; $\underline{f_{-1}(x) = x}$

G_f

1.2 (4)

: $x^2 + kx = 0 \Leftrightarrow x(x+k) = 0$ $\underline{\text{i.A } x_1 = 0 \text{ ; } x_2 = -k \text{ (2 NST)}}$

- 1. SOFA: $\underline{k = 0}$: $\underline{x_{1/2} = 0}$ eine NST
- 2. SOFA: $\underline{k = -1}$: $\underline{x_1 = 0}$ eine NST

1.3 (5)

$(x^2 + kx) : (x-1) = x + k + 1 + \frac{k+1}{x-1}$

$-(x^2 - x)$

$kx + x$

$-(kx - k)$

$x - k$

$-(x - 1)$

$k + 1$

- Schräge Asymptote : $\underline{y = x + k + 1}$
- Senkr. Asymptote : $\underline{x = 1}$

Aufg. 1.4 fehlt!

1.5.1 (5)

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

$f'(x) = \frac{x(x-2)}{(x-1)^2} = 0$

$x_1 = 0$; $x_2 = 2$ (m. VZW)

$f(0) = 0 \Rightarrow \underline{\text{HOP } (0/0)}$

$f(2) = 4 \Rightarrow \underline{\text{TIP } (2/4)}$

		0		1		2	
$x(x-2)$	+	0	−	−	−	0	+
$(x-1)^2$	+	+	+	0	+	+	+
VZ $f'(x)$	+	0	−	↯	−	0	+
G_f :	sms	HOP	smf	↯	smf	TIP	sms

1.6.1 (4)

- $g(x) = 4 \cdot \sin\left[\frac{\pi}{8}(x+2)\right]$
- 4: Streckung um 4 in y-Richtung
- 2: Verschiebung um 2 nach links (x-Richt.)
- $\pi/8$: Streckung in x-Richtung ($p = \frac{2\pi}{\pi} \cdot 8 = 16$

1.6.2 (5)

: $4 \cdot \sin\left(\frac{\pi}{8}x + \frac{\pi}{4}\right) = 0 \Rightarrow \frac{\pi}{8}x_{TR} + \frac{\pi}{4} = 0 \Leftrightarrow x_{TR} = -2$

: Period. Lsgen: $x_k = x_{TR} + k \cdot \frac{p}{2} = -2 + k \cdot \frac{16}{2}$; $x_k = -2 + 8k$

- $\underline{D_{max} = \mathbb{R} \setminus \{-2 + 8k\} \text{ ; } k \in \mathbb{Z}}$

1.7.1 (4)

- $g'(x) = 4 \cdot \frac{\pi}{8} \cdot \sin\left(\frac{\pi}{8}x + \frac{\pi}{4}\right) = \frac{\pi}{2} \cdot \sin\left(\frac{\pi}{8}x + \frac{\pi}{4}\right)$
- $\lim\limits_{x \to 2^-} h'(x) = \lim\limits_{x \to 2^-} \frac{x^2 - 2x}{(x-1)^2} = 0$
- $\lim\limits_{x \to 2^+} h'(x) = \lim\limits_{x \to 2^+} \frac{\pi}{2} \sin\left(\frac{\pi}{8}x + \frac{\pi}{4}\right) = \frac{\pi}{2} \cdot \sin\left(\frac{\pi}{2}\right) = 0$

Beide Grenzwerte gleich

$\Rightarrow$ $\underline{\text{difbar bei } x_0 = 2}$

B12T2 2. Schulaufgabe am 21. 02. 13

2.1 (4)

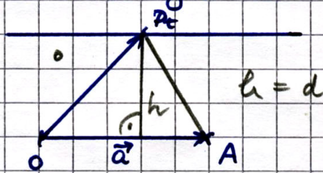
$$J(t) = \frac{1}{2}\,|\vec{a} \times \vec{P_t}| = \frac{1}{2}\left|\begin{pmatrix}3\\0\\4\end{pmatrix} \times \begin{pmatrix}2-3t\\12\\11-4t\end{pmatrix}\right| = \frac{1}{2}\left|\begin{pmatrix}-4\cdot 12\\4(2-3t)-3(11-4t)\\3\cdot 12\end{pmatrix}\right| = \frac{1}{2}\left|\begin{pmatrix}-48\\-25\\36\end{pmatrix}\right| = \frac{1}{2}\sqrt{48^2+25^2+36^2};$$

$$J(t) = \frac{1}{2}\cdot 65$$

$$\underline{J(t) = 32{,}5}$$

2.2 (4)

Gerade $g \parallel AB$



$h = d$

$$J = \frac{1}{2}\,g\cdot h = \frac{1}{2}\,|\vec{a}|\cdot h = \frac{1}{2}\sqrt{3^2+4^2}\cdot h$$

$$\Leftrightarrow J = \frac{1}{2}\cdot\sqrt{25}\cdot h = \frac{5}{2}\cdot h$$

$$\Leftrightarrow h = d = \frac{65}{2}\cdot\frac{2}{5} \Rightarrow h = \underline{d = 13}$$

2.3 (4)

Wenn $\vec{a} \perp \overrightarrow{AP_t}$, dann muss $|\overrightarrow{AP_t}| = 13$ sein:

$$|\overrightarrow{AP_t}| = \left|\begin{pmatrix}2-3t-3\\12\\11-4t-4\end{pmatrix}\right| = \left|\begin{pmatrix}-1-3t\\12\\7-4t\end{pmatrix}\right|$$

$$|\overrightarrow{AP_t}|^2 = (1+3t)^2 + 12^2 + (7-4t)^2 = 13^2 = 169$$

$$\Leftrightarrow 1 + 6t + 9t^2 + 144 + 49 - 56t + 16t^2 = 169 \Leftrightarrow 25t^2 - 50t + 25 = 0$$

$$\Leftrightarrow 25(t-1)^2 = 0 \Rightarrow \underline{t = 1}$$

2.4.1 (3)

$$V_k = \frac{1}{6}\,|(\vec{a} \times \vec{P_t}) \circ \vec{s_k}| \overset{2.1}{=} \left|\begin{pmatrix}-48\\-25\\36\end{pmatrix} \circ \begin{pmatrix}0\\6\\k\end{pmatrix}\right| = \frac{1}{6}\,|-25\cdot 6 + 36k|$$

$$\Rightarrow \underline{V(k) = |25 - 6k|}$$

2.4.2 (3)

Keine Basis, wenn $V_k = 0$, also $|25 - 6k| = 0 \Rightarrow \underline{k = \frac{25}{6}}$

Alle drei Vektoren liegen dann in einer Ebene.