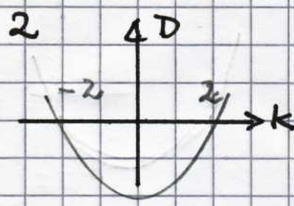
BVKT1 3. Schulaufgabe am 14.07.2010

1.1. (9)

- $2x-1=0 \Leftrightarrow x_N=\frac{1}{2}$; $D_{max}=\mathbb{R}\setminus\{\frac{1}{2}\}$
- $x^2-2kx+4=0$; $D=(-2k)^2-4\cdot1\cdot4=4k^2-16$
- $D=0 \Rightarrow 4k^2-16=0 \Leftrightarrow k_{1/2}=\pm2$
- $k\in\,]-2;2[$: $D<0$; keine NST
- $k\in\{-2;2\}$: $D=2$; je eine dopp. NST
- $k\in\mathbb{R}\setminus[-2;2]$: $D>0$; 2 einf. NST
- SF: x_N in $Z(x)$: $\frac{1}{4}-2k\frac{1}{2}+4=0 \Leftrightarrow k=\frac{17}{4}=4{,}25$
- Nur eine einf. NST ; (f_k ist stet. fortsetzbar)



1.2 (5)

$(x^2-2kx+4):(2x-1)=\frac{1}{2}x+\frac{1}{4}-k+\frac{17/4-k}{2x-1}$

$-(x^2-\frac{1}{2}x)$

$\frac{1}{2}x-2kx+4$

$-(\frac{1}{2}x \qquad -\frac{1}{4})$

$-2kx+\frac{17}{4}$

$-(-2kx+k)$

$\frac{17}{4}-k$

- Schräge As. $y=\frac{1}{2}x+\frac{1}{4}-k$
- Senkr. As. $x=\frac{1}{2}$

(2) **1.3** $f_k(4)=\frac{16-8k+4}{8-1}=0 \Leftrightarrow 20-8k=0 \Leftrightarrow k=\frac{20}{8}=2{,}5$

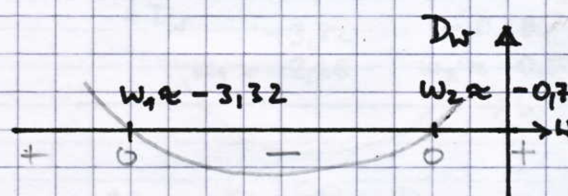
1.4 (5)

$f(x)=\frac{(x-4)(x-1)}{2(x-\frac{1}{2})}$

x		$\frac{1}{2}$		1		4	
$Z(x)$	+	+	+	0	−	0	+
$N(x)$	−	0	+	+	+	+	+
$f(x)$	−	↯	+	0	−	0	+

1.5 (9)

- $x^2-5x+4=w(2x-1)$
- $\Leftrightarrow x^2-5x-2wx+4+w=0$
- $\Leftrightarrow x^2-(5+2w)x+(4+w)=0$
- $D_w=(5+2w)^2-4\cdot(4+w)$
- $=25+20w+4w^2-16-4w$
- $0=4w^2+16w+9$
- $w_{1/2}=\frac{-16\pm\sqrt{16^2-4\cdot4\cdot9}}{2\cdot4}$
- $w_{1/2}=\frac{-4\pm\sqrt{7}}{2}$
- Waagr. Tang. für $w_{1/2}=\frac{-4\pm\sqrt{7}}{2}$



$W_f=\mathbb{R}\setminus\,]\frac{-4-\sqrt{7}}{2};\frac{-4+\sqrt{7}}{2}[$

1.6 G_f u. Asymp. (6)

1.7 (2)

Ges: Bereich für $f(x)>0$

$D_h=\,]\frac{1}{2};1[\,\cup\,]4;\infty[$

$=\,]\frac{1}{2};\infty[\,\setminus\,[1;4]$

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2 (7)

- $A(10) = 3 \cdot b^{10} = 4{,}92 \Leftrightarrow b = \sqrt[10]{\frac{4{,}92}{3}} \approx 1{,}0507$ $= \sqrt[10]{1{,}64}$
- $\Rightarrow \underline{A(t) = 3 \cdot 1{,}0507^{t}}$
- $A(T_V) = 2 \cdot 3 \Rightarrow 3 \cdot 1{,}0507^{T_V} = 2 \cdot 3 \Leftrightarrow 1{,}0507^{T_V} = 2$
- $T_V = \log_{1{,}0507}(2) \approx 14{,}0153$
- $0{,}0153 \cdot 3600 = 55{,}08 \Rightarrow \underline{T_V = 14\,h\ 55\,s}$
- $A(t) = 3 \cdot 1{,}0507^{t} = 3 \cdot e^{kt}$
- $\Rightarrow t \cdot \ln(1{,}0507) = k \cdot t \Leftrightarrow k = \ln(1{,}0507) \approx 0{,}0495$
- $\underline{A(t) = 3 \cdot e^{0{,}0495 \cdot t}}$

3.1 (5)

- $a^2 = b^2 + c^2 - 2bc \cdot \cos\alpha \Leftrightarrow \alpha = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$
- $\alpha = \cos^{-1}\left(\frac{4 + 16 - 9}{2 \cdot 2 \cdot 4}\right) = \cos^{-1}\left(\frac{11}{16}\right) \approx \underline{46{,}567^\circ}$
- $\frac{\sin(\beta)}{b} = \frac{\sin(\alpha)}{a} \Leftrightarrow \sin(\beta) = \frac{b}{a} \cdot \sin(\alpha)$
- $\beta = \sin^{-1}\left(\frac{b}{a} \cdot \sin(\alpha)\right) = \sin^{-1}\left(\frac{2}{3} \cdot \sin(46{,}567^\circ)\right) \approx \underline{28{,}956^\circ}$

3.2 (5)

- $\frac{f}{\sin(\eta)} = \frac{g}{\sin(\varphi)} \Leftrightarrow f = g \cdot \frac{\sin(\eta)}{\sin(\varphi)} = \underline{g \cdot \frac{\sin(\beta)}{\sin(180^\circ - \alpha - \beta)}}$
- $\eta = \delta = \beta$: jew. Wechselwi. $\left(= g \cdot \frac{\sin(28{,}956^\circ)}{\sin(104{,}477^\circ)} \approx \underline{\underline{0{,}50g}}\right)$
- $\varphi = \gamma$: Stufenwi ; $\gamma = 180^\circ - \alpha - \beta$; (WS ΔABC

4.1 (5)

- $p = 12{,}6 \Rightarrow b = \frac{2\pi}{12{,}6} = \frac{10}{63}\pi \approx 0{,}499$
- $t(x) = 2 \cdot \sin\left(0{,}499\,(x-3)\right) = \underline{2 \cdot \sin\left(0{,}499x - 1{,}496\right)}$
- $= 2 \cdot \sin\left(\frac{10}{63}\pi\, x - \frac{10}{21}\pi\right)$

4.2 (2)

- $x_1 \approx 4{,}1$