BVKT1 3. NHSA am 19.07.2011

1.1 $2x + 4k = 0 \iff x = -2k$; $D_{max} = \mathbb{R} \setminus \{-2k\}$

$Z(-2k) = (-2k)^2 + 2(-2k) + 1 = 4k^2 - 4k^2 + 1$

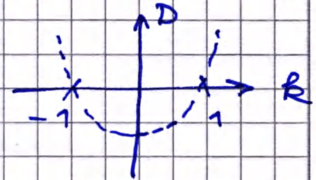
$= 1 \neq 0 \Rightarrow x_N = -2k$ immer Polstelle

1.2 $x^2 + 2kx + 1 = 0$

$D = 4k^2 - 4 \cdot 1 = 4(k^2 - 1) = 4(k+1)(k-1)$

1. Fall: $k \in]-1;1[$: k. NST

2. Fall: $k \in \{-1;1\}$: 1 NST



$k_1 = 1 : x_N = -\frac{2}{2\cdot 1} = -1$ do.

$k_2 = -1 : x_N = -\frac{-2}{2} = 1$ do

3. Fall: $k \in \mathbb{R} \setminus [-1;1]$

$x_{1/2} = \frac{1}{2}\left(-2k \pm \sqrt{4(k^2-1)}\right) = -k \pm \sqrt{k^2-1}$

1.3 $(x^2 + 2kx + 1) : (2x + 4k) = \frac{1}{2}x + \frac{1}{2x+4k}$

$-(x^2 + 2kx)$

$+1$

Schräge As.: $\underline{y = \frac{1}{2}x}$

Senkr. As: $\underline{x = -2k}$

Für $x \to -\infty$: $\underline{f_k(x) \to -\infty}$

1.4 $f_k(3) - f_A(3) = 0{,}5 \Rightarrow r(3) = 0{,}5$

$\frac{1}{2\cdot 3 + 4k} = \frac{1}{2} \iff 6 + 4k = 2$

$\iff 4k = -4 \iff \underline{k = -1}$

1.5 G_{f_1} u. Asympt. u. Abstand v. 1.4

4.) $\cos(\alpha) = \frac{r-h}{r} \iff r \cdot \cos(\alpha) = r - h$

$\iff \underline{h = r - r \cdot \cos(\alpha)}$ $(= r(1 - \cos(\alpha)))$

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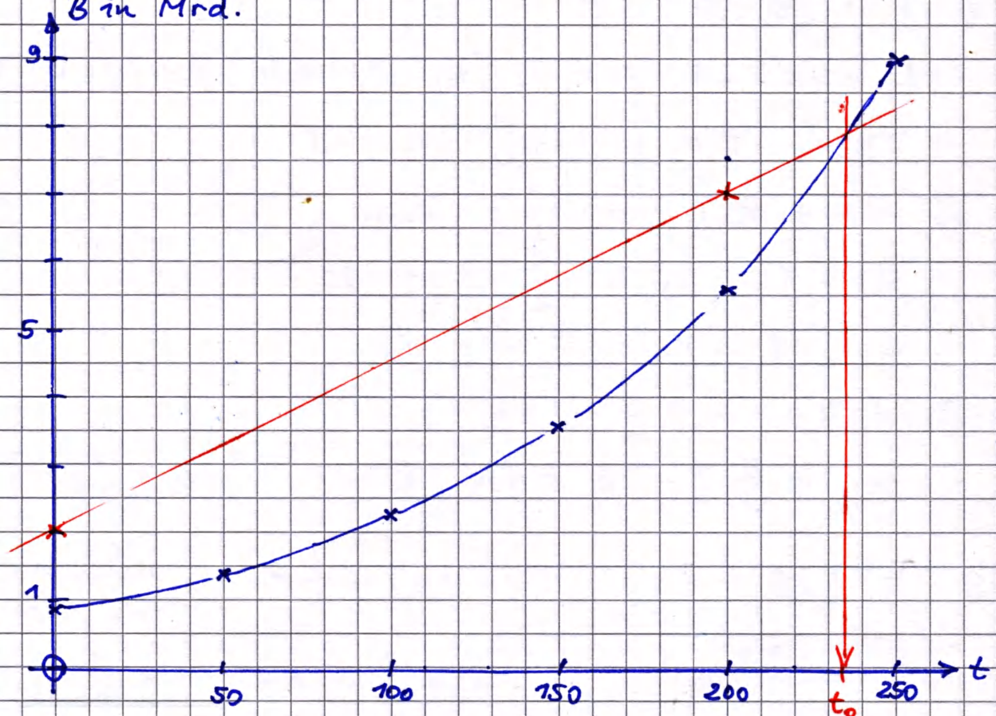
2.1 $B(150) = 0{,}9 \cdot 10^9 \cdot e^{r \cdot 150} = 3{,}6 \cdot 10^9$

$\Leftrightarrow e^{r \cdot 150} = 4 \Leftrightarrow r = \frac{\ln(4)}{150}$

$r \approx 9{,}2 \cdot 10^{-3}$



2.2. $B(t) = B_0 \cdot e^{9{,}2 \cdot 10^{-3} t}$; $B(t_v) = 2B_0$

$B_0 e^{9{,}2 \cdot 10^{-3} t_v} = 2B_0 \Leftrightarrow 9{,}2 \cdot 10^{-3} t_v = \ln(2)$

$t_v = \frac{\ln(2)}{9{,}2 \cdot 10^{-3}} \approx 75 \text{ [a]}$

$B(1) = B_0 \cdot e^{9{,}2 \cdot 10^{-3}} \approx 1{,}00924 = 100{,}924\%$

Jährl. Zunahme um $0{,}924\% = 0{,}92\%$

2.3. z.B $N(200) = 2{,}5 \cdot 10^7 \cdot 200 + 2 \cdot 10^9 = 7{,}0 \cdot 10^9$

$t_0 \approx 235 \text{ [a]} \Rightarrow$ Im Jahre 2035

3. $A = 2$; $b = \frac{2\pi}{p} = \frac{2\pi}{4} = \frac{1}{2}\pi$

$s(x) = 2 \cdot \sin\left(\frac{1}{2}\pi(x-1)\right) = 2 \cdot \sin\left(\frac{1}{2}\pi x - \frac{1}{2}\pi\right)$