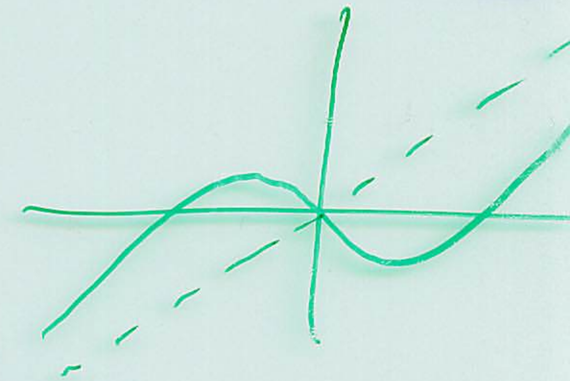
ad Klausur 1.Vo 1

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n^2+3}}$$

$$a_n = \frac{1}{\sqrt{n^2+3}}$$

$$f(x) = \frac{x^3 - x}{x^2+1}$$

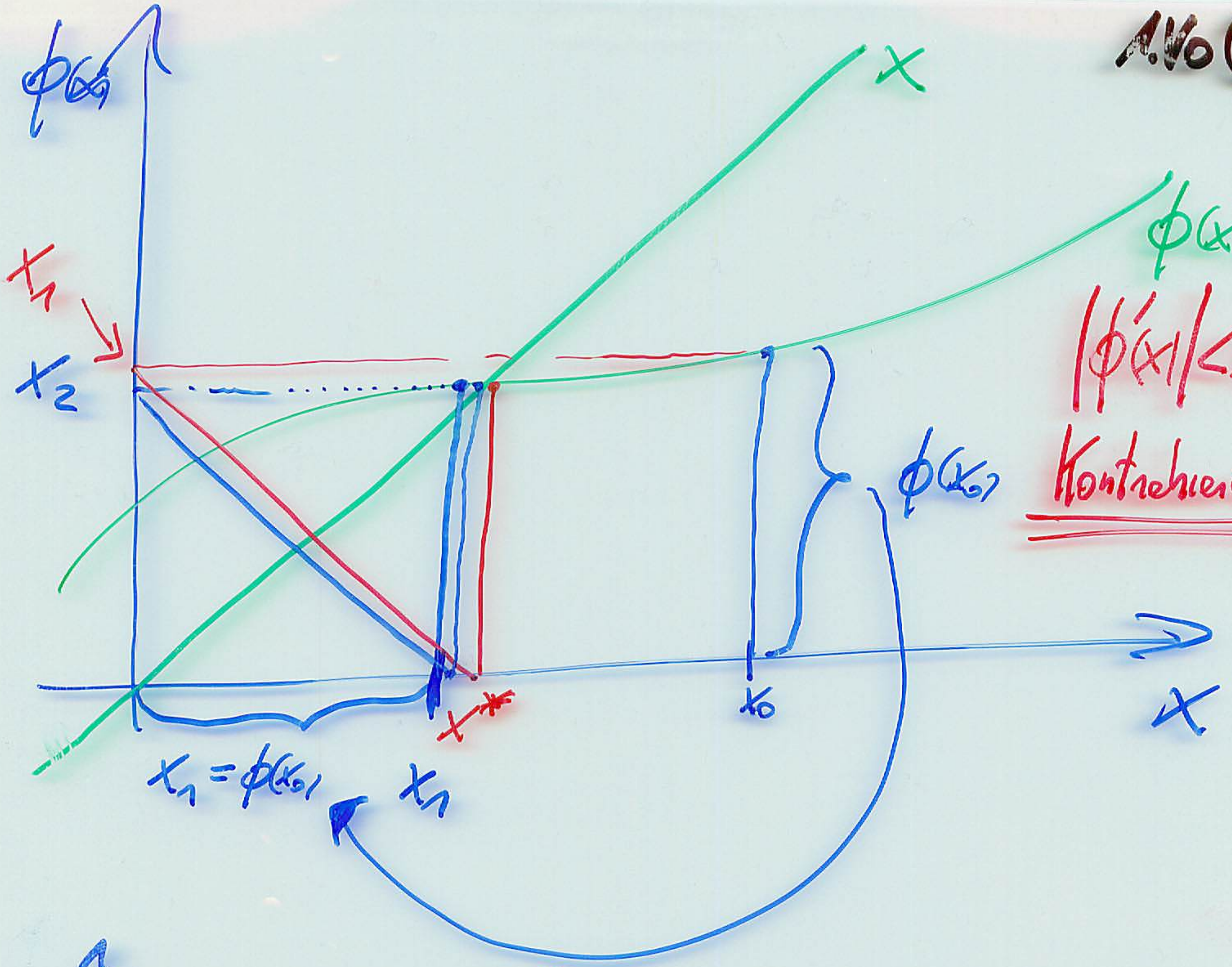


$$= \frac{x^3 + x - x - x}{x^2+1} =$$

$$= \frac{x^3+x}{x^2+1} - \frac{2x}{x^2+1} = x - \frac{2x}{x^2+1}$$

$$\lim_{x\to\infty} \left(f(x) - x\right) = \ldots$$

A.Vo (2)



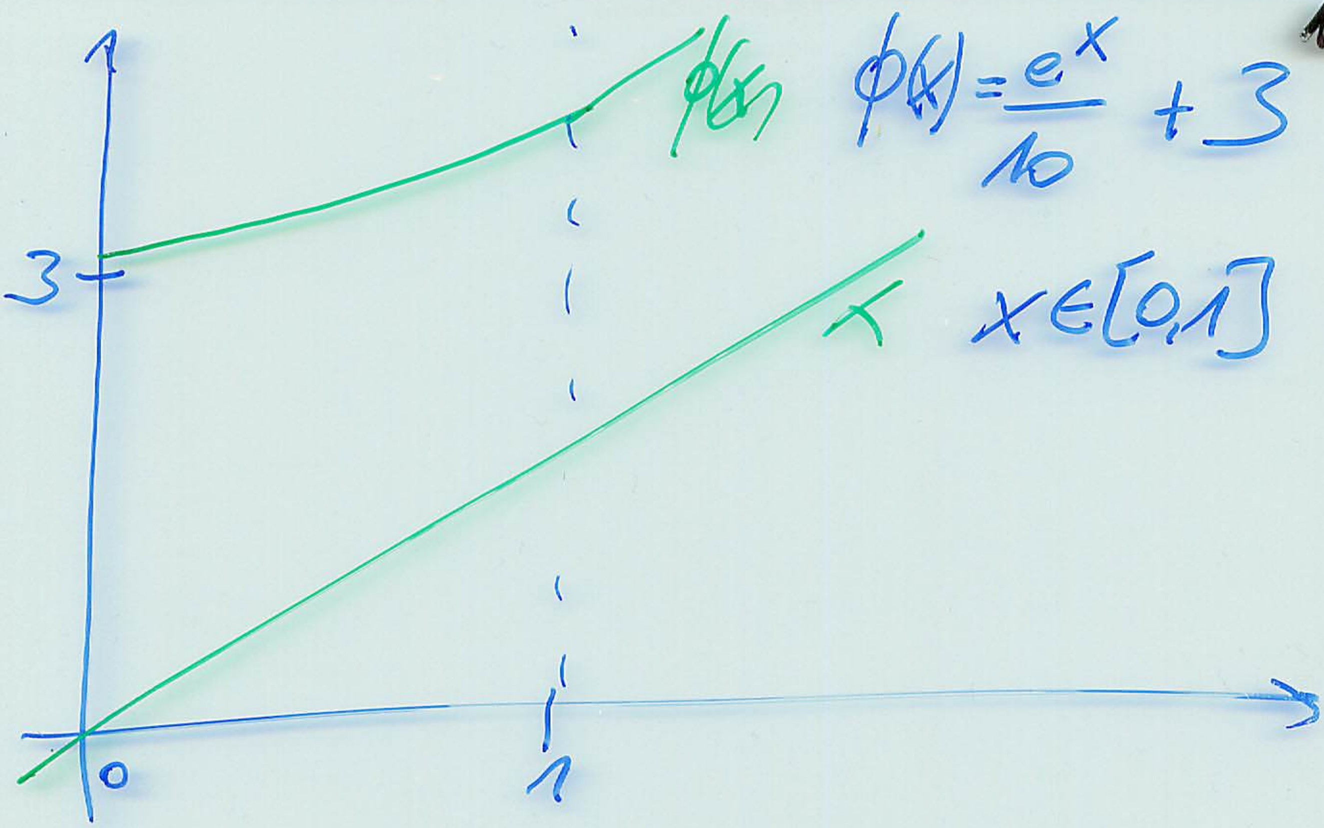
$|\phi'(x)| < 1$

Kontrahierend

$|\phi'(x)| > 1$

Nicht Kontrahierend

1.16 3



$\phi(x) = \frac{e^x}{10} + 3$

$x \in [0,1]$

$\phi'(x) = \frac{e^x}{10}$

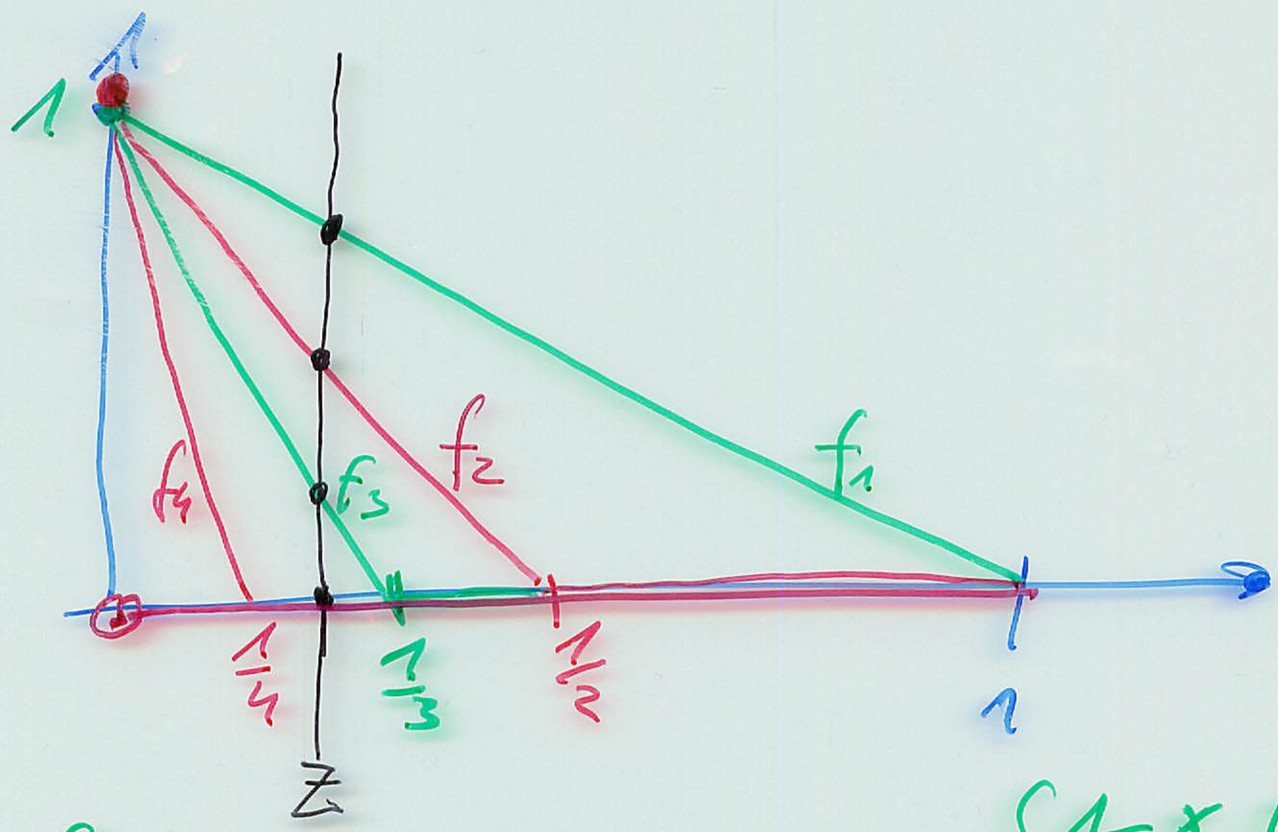
$L = \max \{ |\phi'(x)| \ x \in [0,1] \} < 1$

$L = 0{,}3$

!! $\phi : [0,1] \not\to [0,1]$

$\to [3+0{,}1 , 3+\frac{e}{10}]$

$$f_n(x) = \begin{cases} 1 - nx & [0, \frac{1}{n}] \\ 0 & (\frac{1}{n}, 1] \end{cases}$$



$$f_n(0) = 1$$

$$f_1(x) = \begin{cases} 1 - x & [0, 1] \end{cases}$$

$$f_2(x) = \begin{cases} 1 - 2x & [0, \frac{1}{2}] \\ 0 & (\frac{1}{2}, 1] \end{cases}$$

$$f_1(z) > f_2(z) > f_3(z) > f_4(z) = 0 = f_5(z) = \dots$$

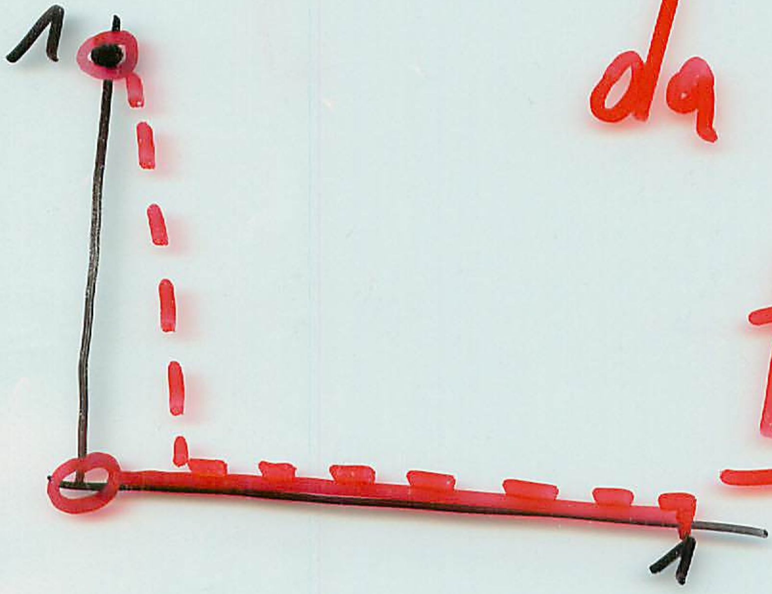
$\forall z \in (0,1]$ $(f_n(z))_{n \in \mathbb{N}}$ Nullfolge $\quad f_n(0) = 1 \ \forall n \in \mathbb{N}$

$$f_n \longrightarrow f = \begin{cases} 1 & x=0 \\ 0 & x\in(0,1] \end{cases}$$

punktweise

Aber:

$$\|f_n - f\|_\infty = 1 \quad \forall n$$



da $f_n(x) - f(x) \approx 1$

für x nahe 0