

Übung 5

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Aufgabe 1

a) $\tilde{x}_1 = -1.125$

$$\tilde{x}_2 = 0.3389$$

$$\tilde{x}_3 = 0.7864 \quad T(x)_{n+1} = x_n^3 + 0.3 \Rightarrow T'(x) = 3x_n^2$$

~~$\tilde{x}_1, \tilde{x}_2, \tilde{x}_3 = [-1.125, 1]$~~

$$|T'(\tilde{x}_1)| = |3 \cdot (-1.125)^2| > 1 \Rightarrow \tilde{x}_1 \text{ abstoßend.}$$

$$|T'(\tilde{x}_2)| = |3 \cdot (0.3389)^2| < 1 \Rightarrow \tilde{x}_2 \text{ anziehend.}$$

$$|T'(\tilde{x}_3)| = |3 \cdot (0.7864)^2| > 1 \Rightarrow \tilde{x}_3 \text{ abstoßend.}$$

b) $T(x) = x_{n+1} = \sqrt[3]{x_n - 0.3}$

$$\Rightarrow T'(x) = \frac{d}{dx} \left((x_n - 0.3)^{\frac{1}{3}} \right) = \frac{1}{3} \cdot (x_n - 0.3)^{-\frac{2}{3}}$$

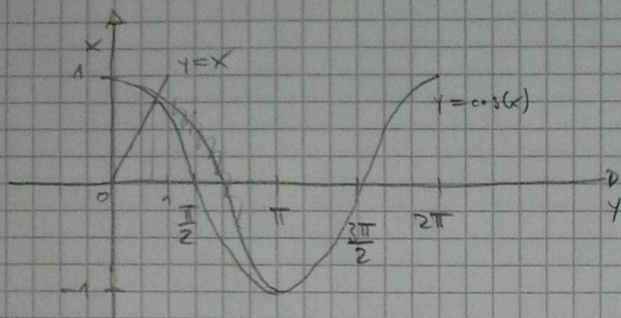
$$= \frac{1}{3 \cdot \sqrt[3]{(x_n - 0.3)^2}}$$

$$|T'(\tilde{x}_1)| = \frac{1}{1.266} < 1 \Rightarrow \tilde{x}_1 \text{ anziehend.}$$

$$|T'(\tilde{x}_2)| = \frac{1}{0.015} > 1 \Rightarrow \tilde{x}_2 \text{ abstoßend.}$$

$$|T'(\tilde{x}_3)| = \frac{1}{0.618} > 1 \Rightarrow \tilde{x}_3 \text{ abstoßend.}$$

c) $x = \cos(x) \Rightarrow x_{n+1} = \cos(x_n)$



~~Start~~ $x_0 = 0.5$

n	x_n
0	0.5
1	0.8776
2	0.6390
3	0.8027
4	0.6948
5	0.7682
6	0.7192
7	0.7526
8	0.7301
9	0.7451
10	0.7350
11	0.7418
12	0.7372
13	0.7403
14	0.7382
15	0.7396

$\Rightarrow x = \underline{\underline{0.73}}$