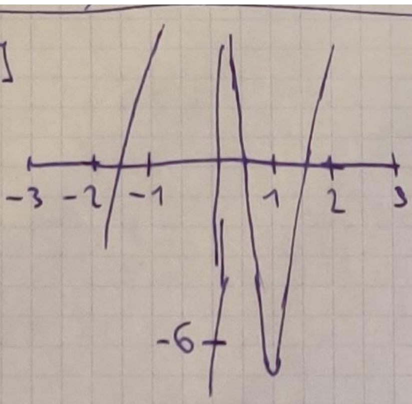
1. $e^{x^2} + x^{-3} = 10 \qquad x \in [-3, 3]$

$f(x) = e^{x^2} + x^{-3} - 10 = 0$



$f'(x) = 2x e^{x^2} + \frac{3}{x^4}$

Newton-Verfahren:

$x_0 = 2$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$x_1 = 2 + \frac{e^{2^2} + 2^{-3} - 10}{2 \cdot 2 \cdot e^{2^2} + \frac{3}{2^4}} = 1.7954$$

$$x_2 = 1.7954 + \frac{f(1.7954)}{f'(1.7954)} = 1.6264$$

$x_3 = 1.5330$

$x_4 = 1.5096$

vereinfachtes Newton-Verfahren:

$x_0 = 0.5$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_0)}$$

$$x_1 = 0.5 - \frac{f(0.5)}{f'(0.5)} = 0.5145$$

$$x_2 = 0.5145 - \frac{f(0.5145)}{f'(0.5)} = 0.5420$$

$x_3 = 0.5902$

$x_4 = 0.6657$

Sekantenverfahren:

$x_0 = -1.0$

$x_1 = -1.2$

$$x_{n+1} = x_n - \frac{x_n - x_{n-1}}{f(x_n) - f(x_{n-1})} \cdot f(x_n)$$

$(n=1)\quad x_2 = -1.2 - \frac{-1.2-(-1)}{f(-1.2)-f(-1)} \cdot f(-1.2) = -1.861$

$x_3 = -1.3494$

$x_4 = -1.4326$

$x_5 = -1.5594$