

## Aufgabe 1

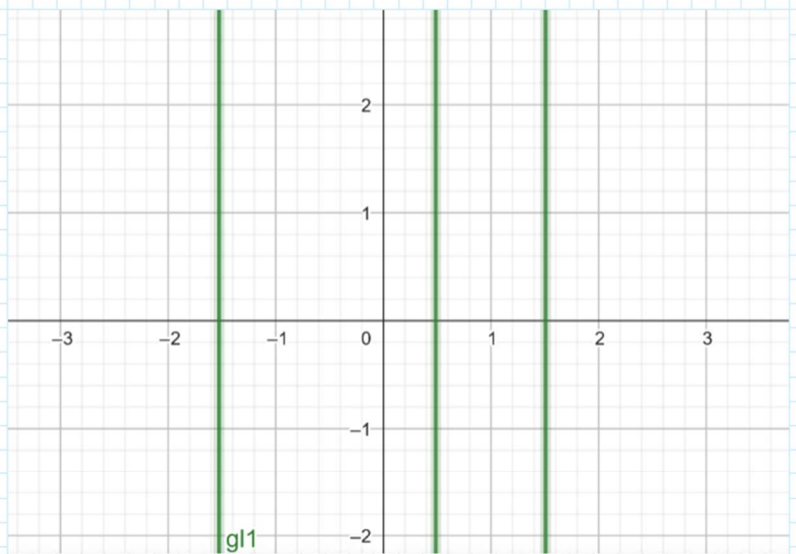
3 Nullstellen

$[-2, -1]$ ,  $[0, 1]$ ,  $[1, 2]$

$$e^{x^2} + x^{-3} = 10$$

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

$$f'(x) = e^{x^2} \cdot 2x - 3x^{-4}$$



Newtonverfahren:

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

Startwert	Resultat
$x_0 = 2$	1,7950
$x_1 = 1,7950$	1,6250
$x_2 = 1,6250$	1,5308
$x_3 = 1,5308$	1,5086
$x_4 = 1,5086$	1,5076
$x_5 = 1,5076$	<u>1,5076</u>

Startwert	Resultat
$x_0 = 0,5$	0,4847
$x_1 = 0,4847$	0,4856
$x_2 = 0,4856$	0,4856
$x_3 = 0,4856$	<u>0,4856</u>

vereinfachtes Newtonverfahren:

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

Startwert	Resultat
$x_0 = 2$	1,7950
$x_1 = 1,7950$	1,7251
$x_2 = 1,7251$	1,6802
$x_3 = 1,6802$	1,6479
$x_4 = 1,6479$	<u>1,6235</u>
$x_5 = 1,6043$	1,5889
$x_6 = 1,5889$	1,5764
$x_7 = 1,5764$	1,5660

Startwert	Resultat
$x_0 = 0,5$	0,4847
$x_1 = 0,4847$	0,4857
$x_2 = 0,4857$	0,4856
$x_3 = 0,4856$	0,4856
$x_4 = 0,4856$	<u>0,4856</u>

Sekantenverfahren:

$$x_0 = 1 \quad x_1 = 1,2$$

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

Startwert	Resultat
$x_0 = 1,0$	
$x_1 = 1,2$	2,1621
$x_2 = 2,1621$	1,2488
$x_3 = 1,2488$	1,2912
$x_4 = 1,2912$	1,6565