S05 Aufg01 - Jari Rentsch, Sydney Nguyen

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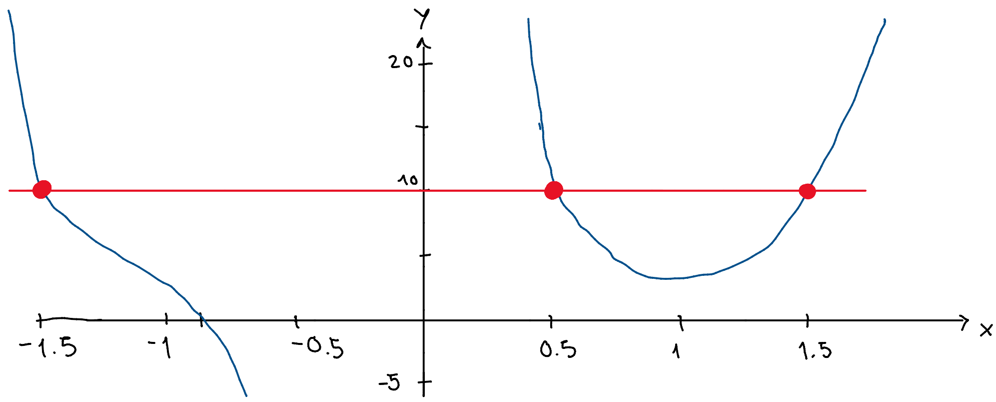
$$e^{x^2} + x^{-3} = 10$$



Newton-Verfahren:

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

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

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

Für $x_0 = 2$:

n	x_n	
0	2	
1	1.795040766664155	≈ 1.7950
2	1.6250816927861245	≈ 1.6251
3	1.5307701258451658	≈ 1.5308
4	1.5086293201653753	≈ 1.5086

Vereinfachtes Newton-Verfahren:

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_0)} \quad . \quad f'(0.5) \approx -46.7160$$

Für $x_0 = 0.5$:

n	x_n	
0	0.5	
1	0.4846738810503588	≈ 0.4847
2	0.4857005232901387	≈ 0.4857
3	0.4855644460579851	≈ 0.4856
4	0.48558189957472286	≈ 0.4856

Sekantenverfahren:

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

Für $x_0 = -1.0$, $x_1 = -1.2$:

n	x_n	
0	-1.0	
1	-1.2	= -1.2000
2	-1.8610151161359973	≈ -1.8610
3	-1.34941760464263	≈ -1.3494
4	-1.4326421012234578	≈ -1.4326
5	-1.5593897218430148	≈ -1.5594