

## IV.1.3 Newton-Verfahren

Idee: Linearisiere  $f$

Taylor-Entwicklung von  $f$  an der  $k$ -ten Iteration  $x^{(k)}$ :

$$f(x) = \underbrace{f(x^{(k)}) + f'(x^{(k)}) \cdot (x - x^{(k)}) + \dots}$$

$$\tilde{f}(x) \stackrel{!}{=} 0 \leadsto x^{(k+1)}$$

$$\leadsto \tilde{f}(x^{(k+1)}) = f(x^{(k)}) + f'(x^{(k)}) \cdot (x^{(k+1)} - x^{(k)}) \stackrel{!}{=} 0$$

$$\leadsto x^{(k+1)} = x^{(k)} - \frac{f(x^{(k)})}{f'(x^{(k)})}$$

Graphisch:

