Rem.: (i) Needs f'

(ii) Quadratic convergence ($p=2$) when close enough

(iii) Can fail, e.g. $f'(x^{(k)})=0$

(iv) Generalizes to systems

II.1.4 Secant method

Idea: If f' is not directly available or expensive to compute, approx. f' with finite differences

$$f'(x^{(k)}) \approx \frac{f(x^{(k)}) - f(x^{(k-1)})}{x^{(k)} - x^{(k-1)}}$$

Then

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