Nonlinear equations - Summary

$$f(x) = 0\,.$$

- **Fixed point**

$$g(x) = f(x) + x\,.$$

$$x_{k+1} = g(x_k)$$

- **Bisection**

$$x_k = (a_k + b_k)/2$$

  - if $f(a_k)f(x_k) > 0$,

$$a_{k+1} = x_k, b_{k+1} = b_k$$

  - otherwise

$$a_{k+1} = a_k, b_{k+1} = x_k$$

- **Newton**

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)}$$

- **Secant**

$$x_{k+1} = x_k - f(x_k)\,\frac{x_k - x_{k-1}}{f(x_k) - f(x_{k-1})}$$