

## Newton's method for approximating zeros of functions

Let  $g$  be a continuously differentiable function on  $\mathbb{R}$ .

Suppose that  $g(x_*) = 0$ ,  $g'(x_*) \neq 0$ , and  $x_0$  is sufficiently close to  $x_*$ .

For  $n \geq 0$ , let  $x_{n+1} = x_n - \frac{g(x_n)}{g'(x_n)}$ , that is

$$x_{n+1} = F(x_n), \text{ where } F(x) = x - \frac{g(x)}{g'(x)}.$$

Then the sequence  $x_n = F^n(x_0)$  converges to  $x_*$ .