

# Roots of Equations

Compute  $x$  such that  $f(x) = 0$

NOTE:

$$g(x) = 20$$

$$g(x) - 20 = 0$$

$$f(x) = 0$$

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$$g(x) = x^2 - 2x + 5$$

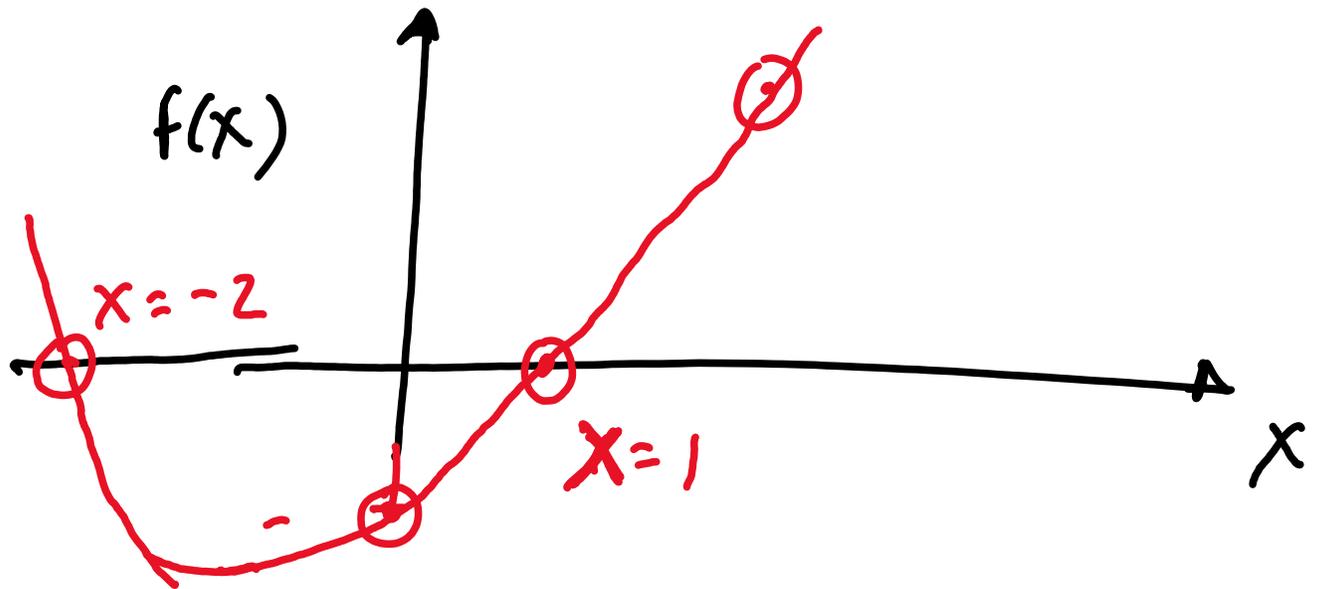
$$g(x) - x^2 + 2x - 5 = 0$$

$$f(x) = 0$$

## Motivating example

Compute  $x$  such that

$$f(x) = \underline{x^2} + \underline{x} - \underline{2} = 0$$



## Three steps for root finding

① Initialize a solution (usually guess a solution)

② Search Direction

Figure out the next best guess

③ Termination criteria

went to stop.

$$(a) \quad \|f(x)\| < \epsilon$$

(user chosen value)

$$\epsilon = 10^{-2}$$

(b) iterations  $>$  max-iteration  
stop.