# MATLAB's fzero Function

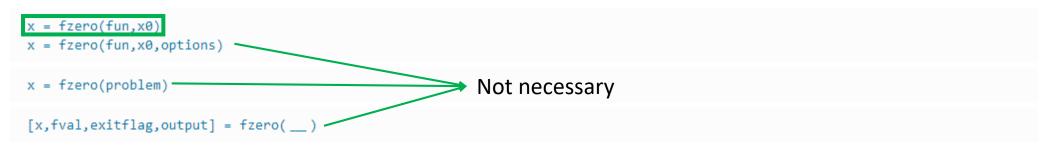
A Quick Review

## fzero

#### fzero

Root of nonlinear function

#### Syntax



### Description

x = fzero(fun,x0) tries to find a point x where fun(x) = 0. This solution is where fun(x) changes sign—fzero cannot find a root of a function such as  $x^2$ .

## fzero

### ~

#### fun - Function to solve

function handle | function name

Function to solve, specified as a handle to a scalar-valued function or the name of such a function. fun accepts a scalar x and returns a scalar fun(x).

fzero solves fun(x) = 0. To solve an equation fun(x) = c(x), instead solve fun2(x) = fun(x) - c(x) = 0.

To include extra parameters in your function, see the example Root of Function with Extra Parameter and the section Parameterizing Functions.

Example: 'sin'

Example: @myFunction

**Example:**  $@(x)(x-a)^5 - 3*x + a - 1$ 

"
$$f(x) = 0$$
" form!

## fzero



#### x0 - Initial value

scalar | 2-element vector

Initial value, specified as a real scalar or a 2-element real vector.

- Scalar fzero begins at x0 and tries to locate a point x1 where fun(x1) has the opposite sign of fun(x0). Then fzero iteratively shrinks the interval where fun changes sign to reach a solution.
- 2-element vector fzero checks that fun(x0(1)) and fun(x0(2)) have opposite signs and errors if they do not. It then iteratively shrinks the interval where fun changes sign to reach a solution. An interval x0 must be finite; it cannot contain ±Inf.



Calling fizero with an interval (x0 with two elements) is often faster than calling it with a scalar x0.

Example: 3

**Example:** [2,17]

Just like bisection!

# Manning Equation

Manning Equation:

$$Q = \frac{\sqrt{S}(BH)^{5/3}}{n(B+2H)^{2/3}}$$

- Find H given S, B, n, and Q.
- Rewrite this in "f(x) = 0 form":

$$0 = \frac{\sqrt{S}(BH)^{5/3}}{n(B+2H)^{2/3}} - Q$$