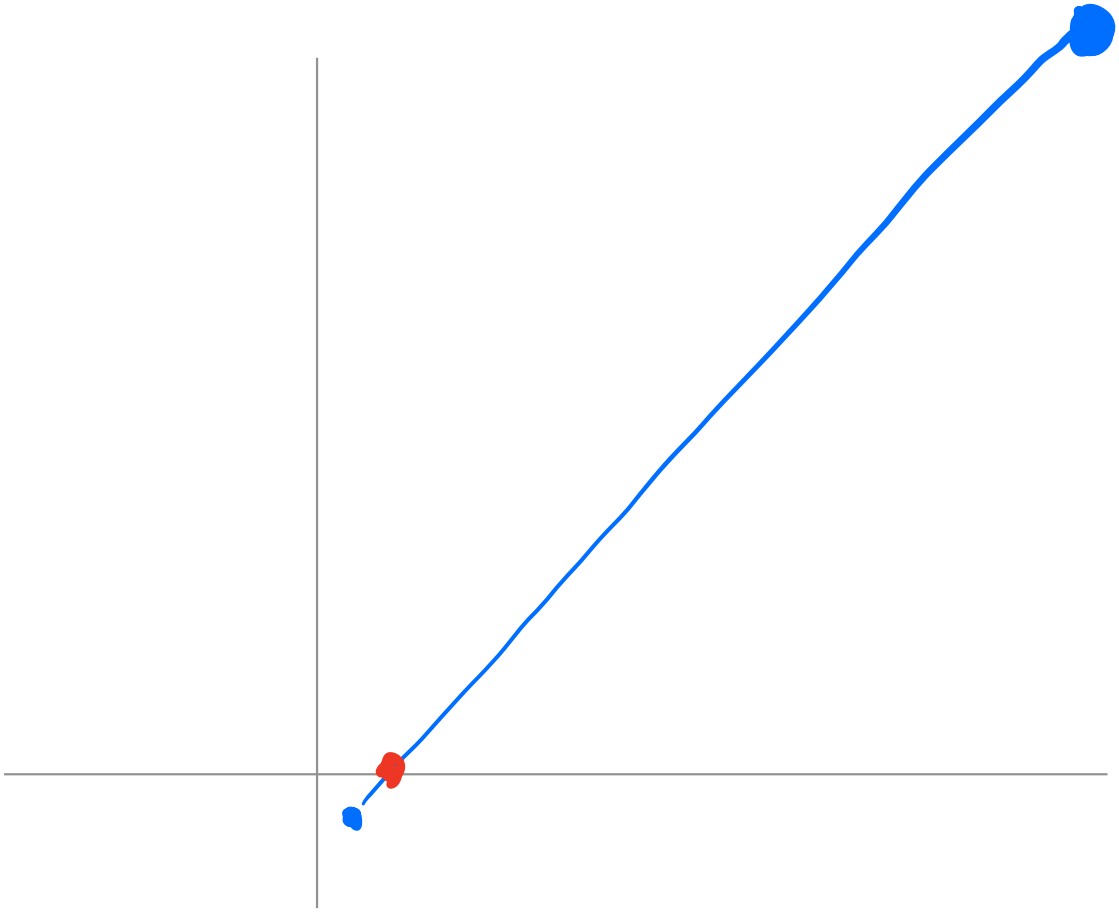
False Position or Regula Falsi



Newton's Method

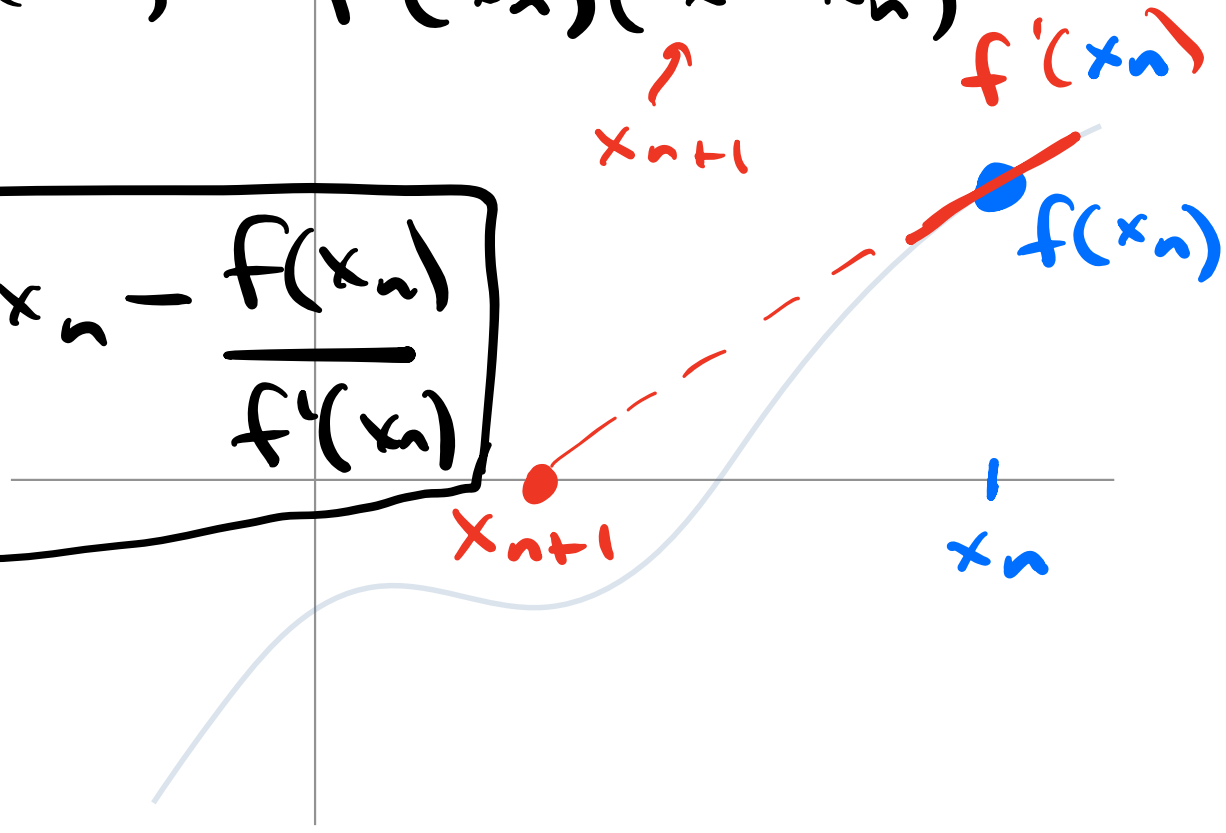
$$f'(x_n) = \frac{0 - f(x_n)}{x_{n+1} - x_n}$$

$$y = f(x_n) - f'(x_n)(x - x_n)$$

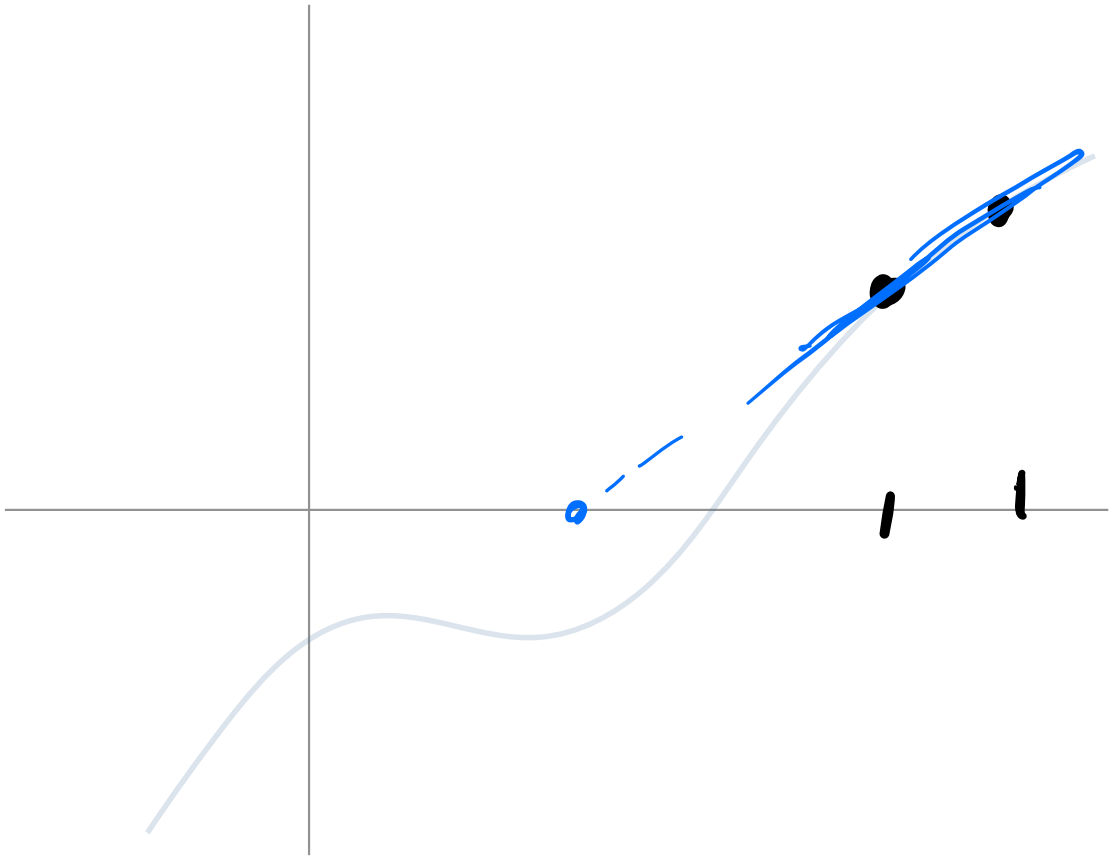
$y \leftarrow 0$

$x \leftarrow x_{n+1}$

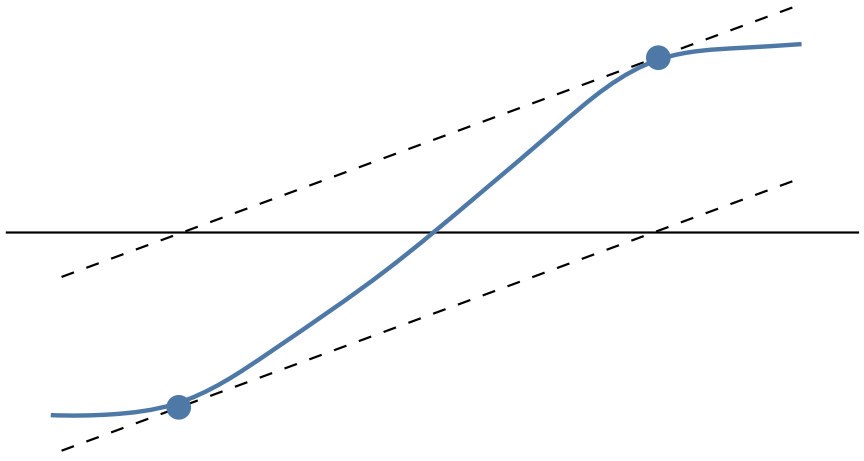
$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$



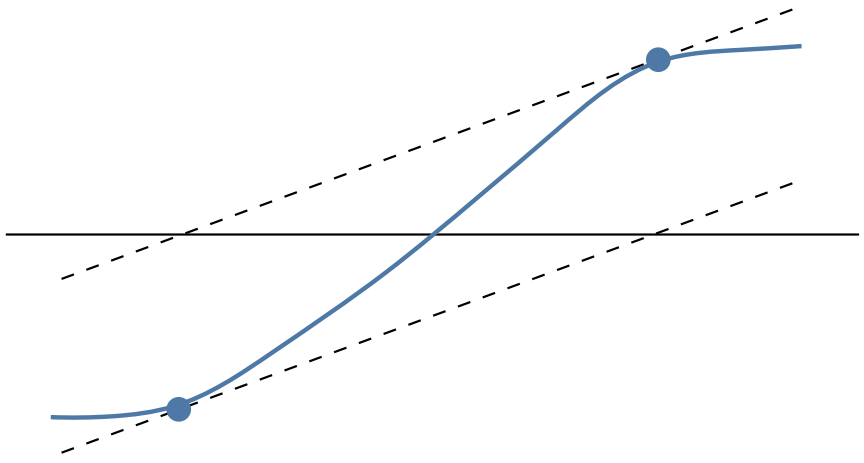
Secant Method

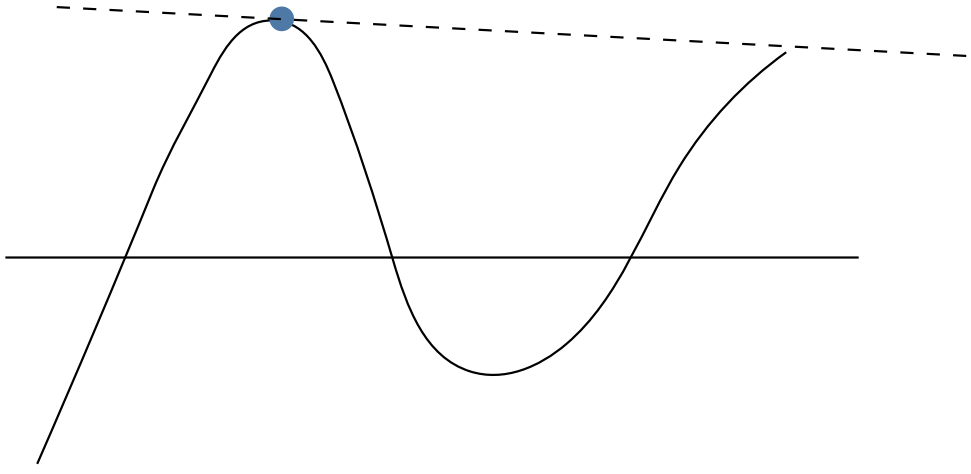


Failures

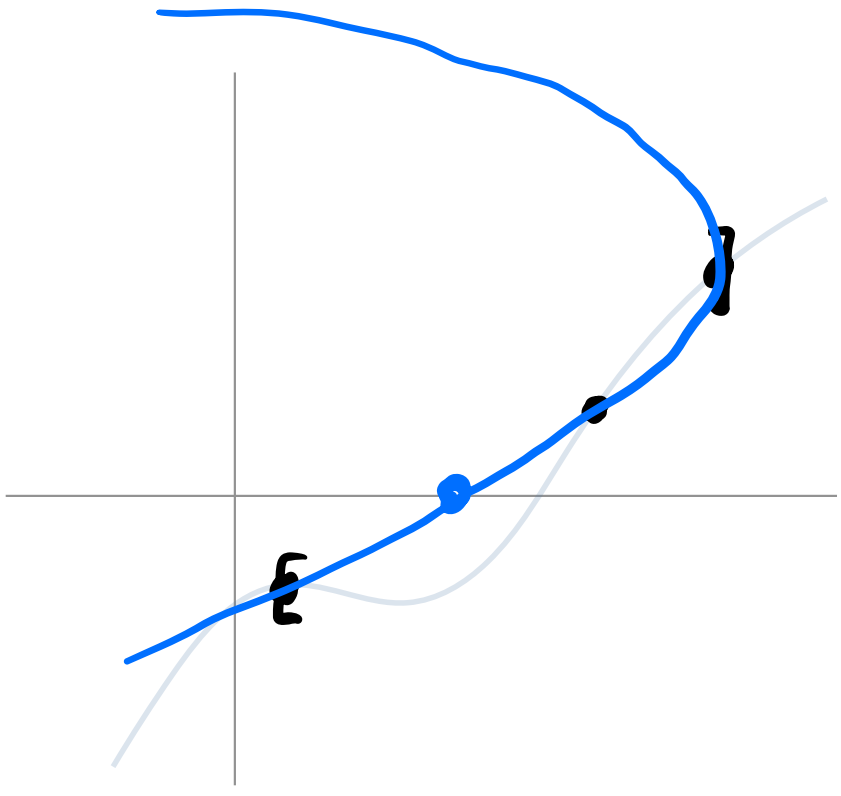


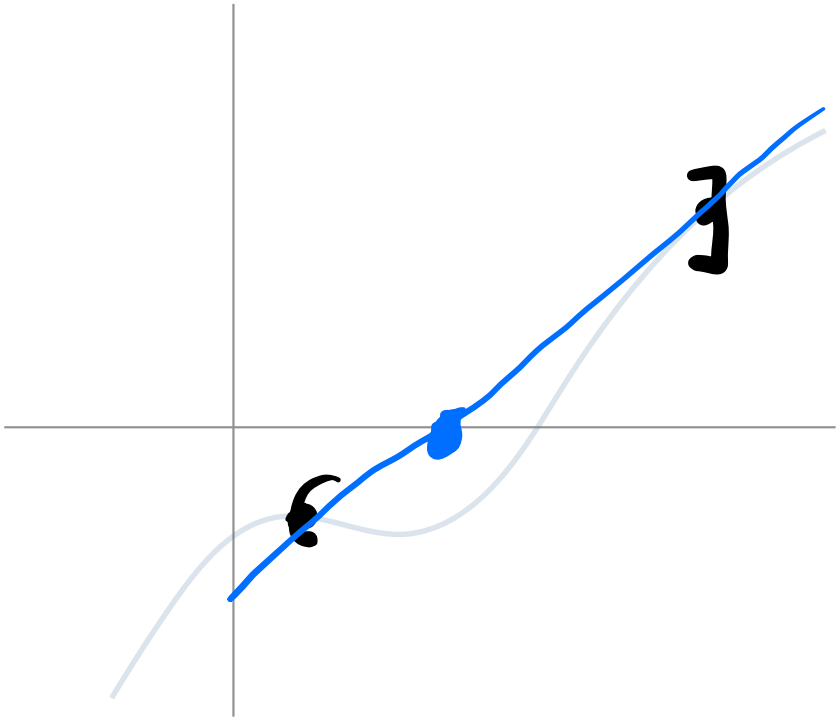
Failures





Brent's method





Algorithm 748

Method Types

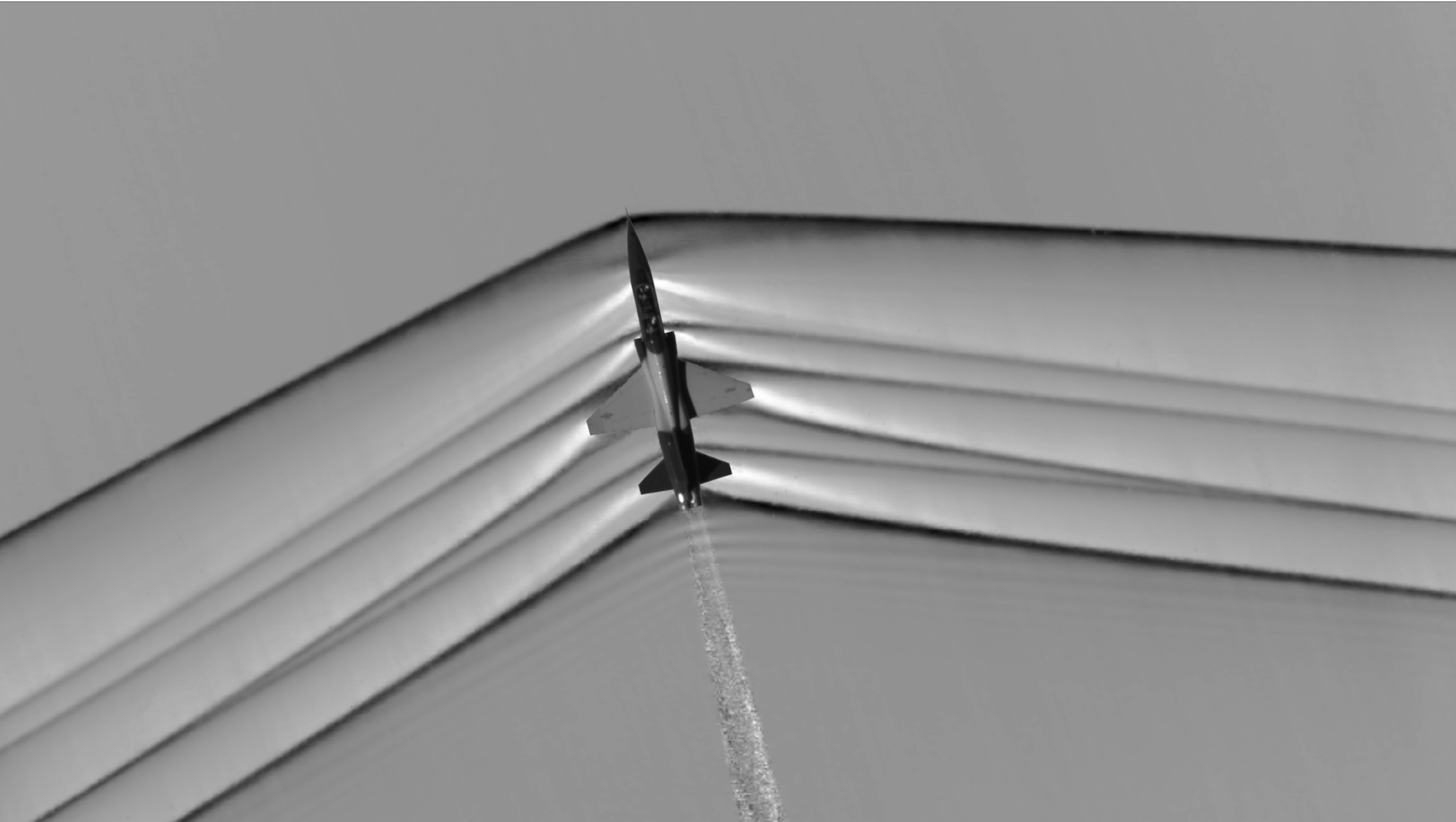
Bracketing	Guaranteed convergence. slow.
Derivatives (open)	Faster. but no guarantees.
Hybrid	Guaranteed convergence. almost as fast.

Scipy

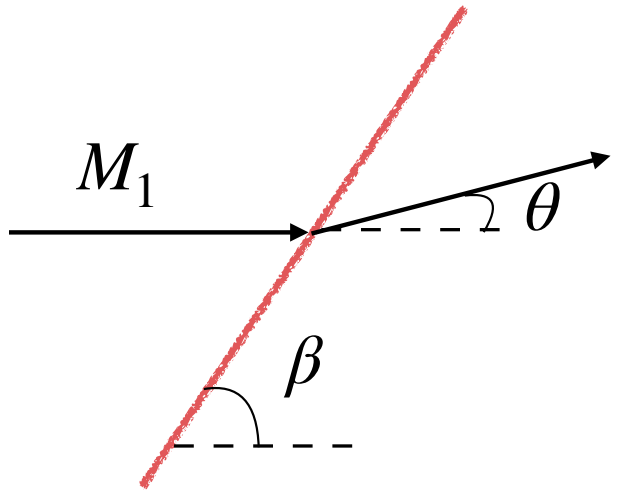
method : ***str, optional***

Type of solver. Should be one of

- ‘bisect’ (see here)
- ‘brentq’ (see here)
- ‘brenth’ (see here)
- ‘ridder’ (see here)
- ‘toms748’ (see here)
- ‘newton’ (see here)
- ‘secant’ (see here)
- ‘halley’ (see here)



Oblique Shock Wave



$$\tan\theta = \frac{2}{\tan\beta}\left(\frac{M_1^2\sin^2\beta - 1}{M_1^2[\gamma + \cos(2\beta)] + 2}\right)$$

$M_1 = 2.0$

$\theta = 15°$

$\beta = ?$

$\left[\sin^{-1}\left(\frac{1}{M_1}\right),\ 64°\right]$

$\gamma = 1.4$