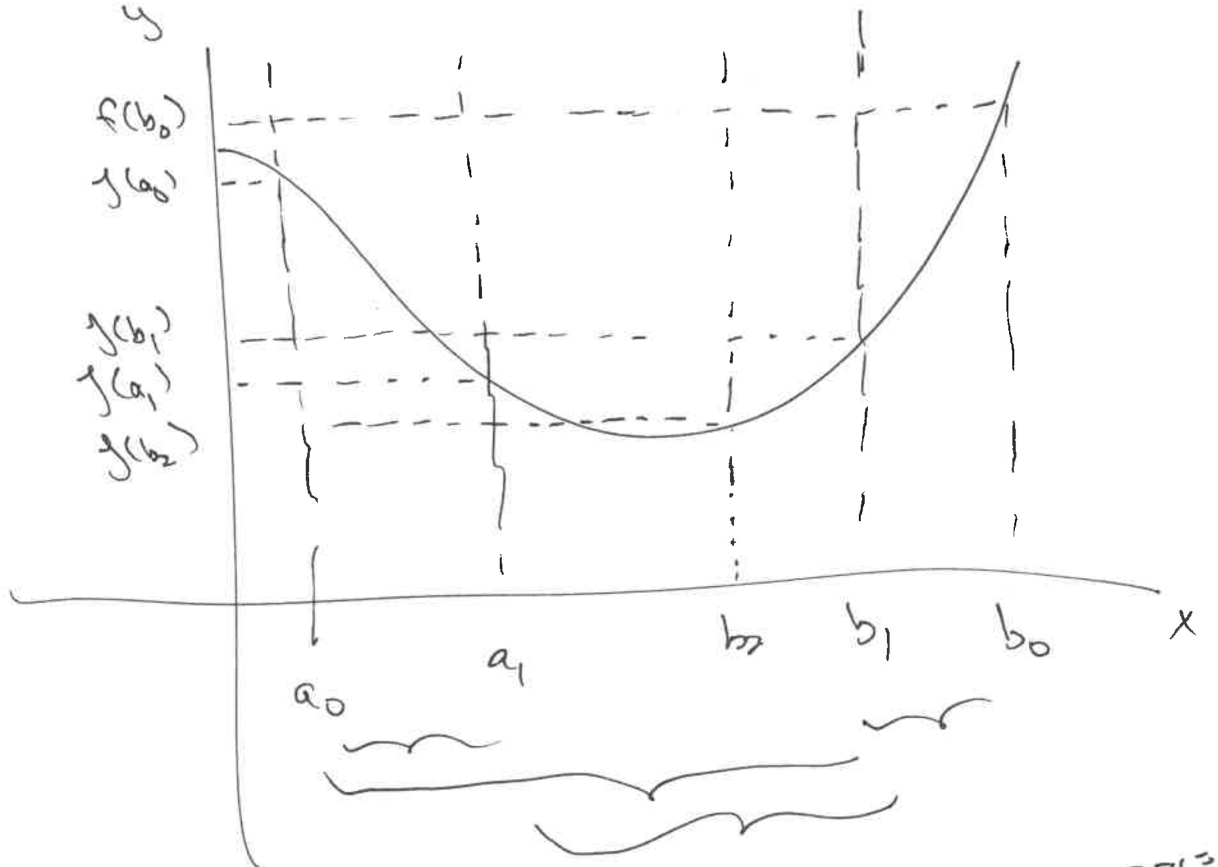
Golden Ratio Search



$\rho = 0.381 = 1 + \frac{1}{\phi}$

→ know $[a_0, b_0]$ contains minimum

→ choose a_1, b_1 such that $a_1 - a_0 = b_0 - b_1 = \rho(b_0 - a_0)$

$$\Rightarrow b_1 - a_0 = b_0 - a_1$$

$$= b_0 - \cancel{a_1} + (\cancel{a_1} - a_0) - (b_0 - b_1)$$

$$= b_0 - a_0 - (b_0 - b_1)$$

$$\cancel{b_1 - a_2} = \cancel{(1-\rho)(b_0 - a_0)}$$

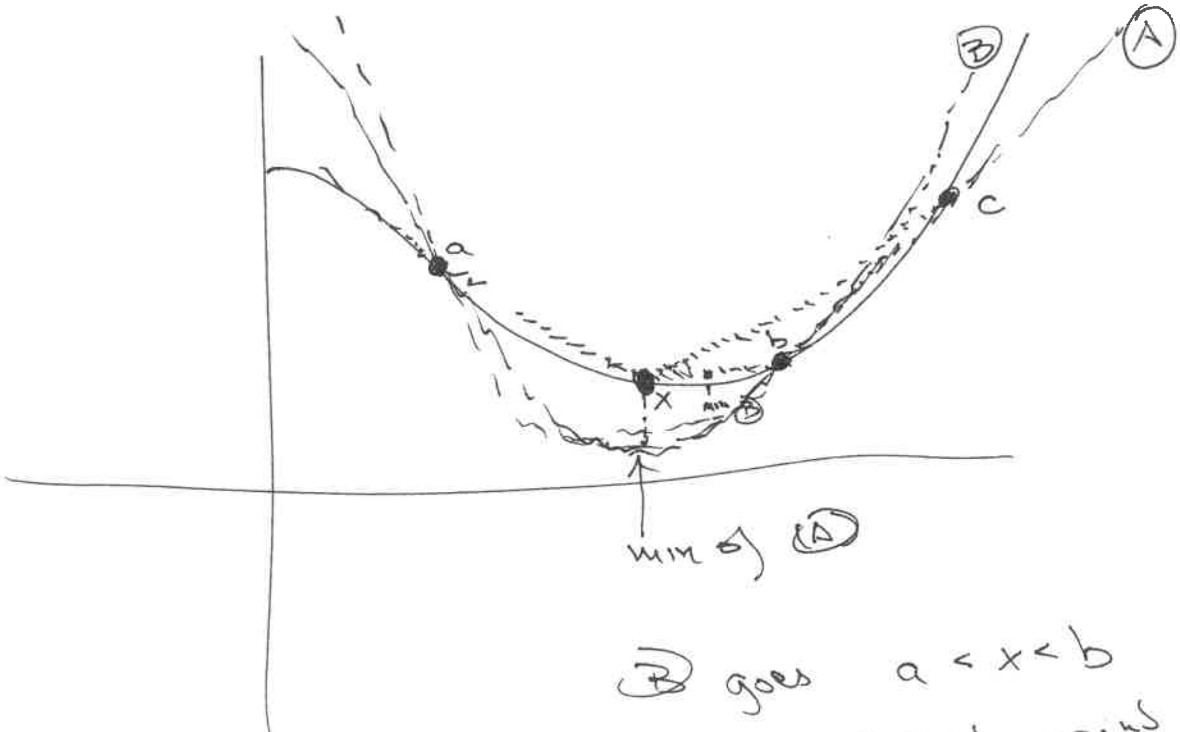
→ $f(a_1)$ < ~~lower than~~ $f(b_1)$

⇒ next interval is (a_0, b_1)

→ choose b_2 in this interval s.t. $b_1 - b_2 = \rho(b_1 - a_0)$

→ compare $f(b_2)$ to $f(a_1)$

Brent's Method → w 1D x



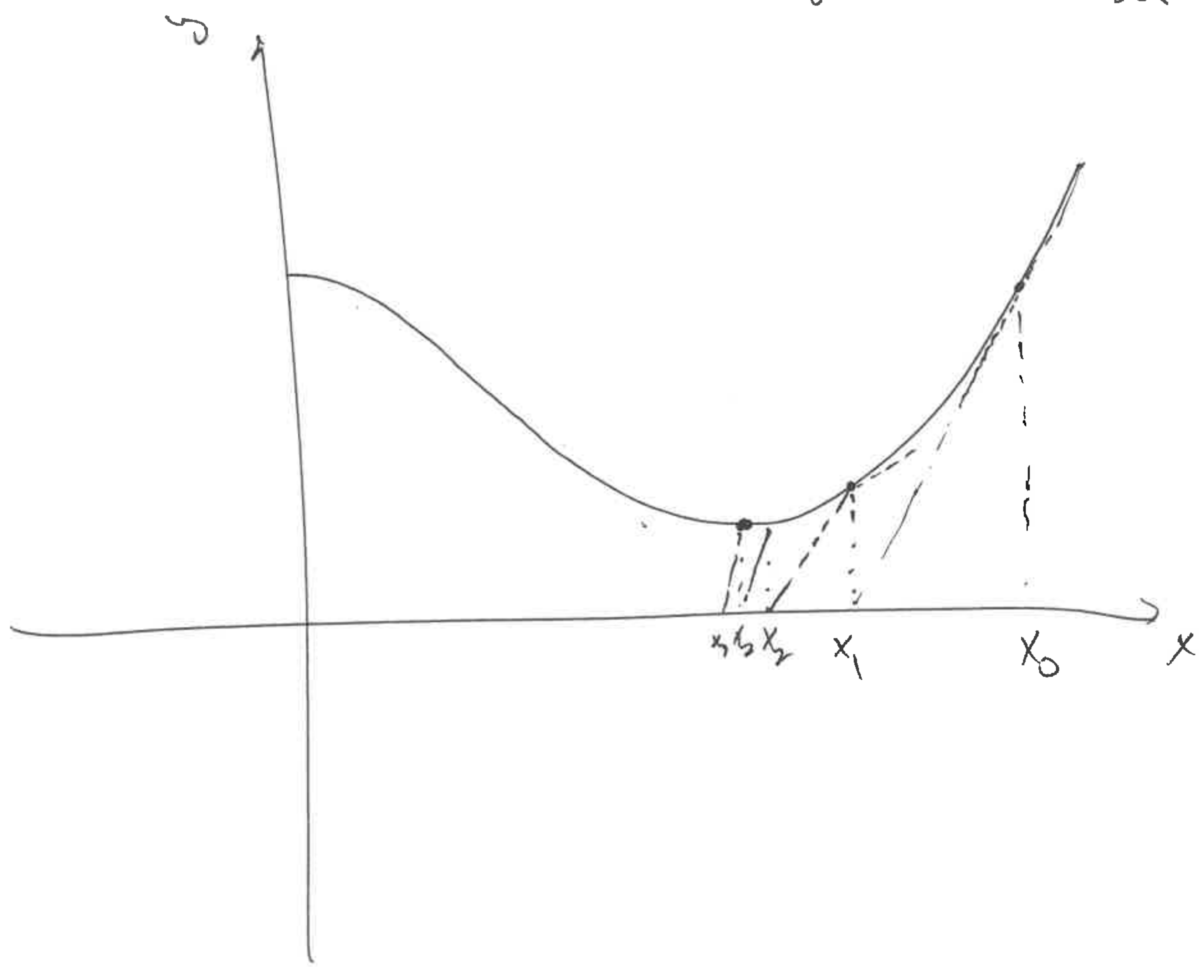
B goes $a < x < b$

⇒ next point = a, x, b

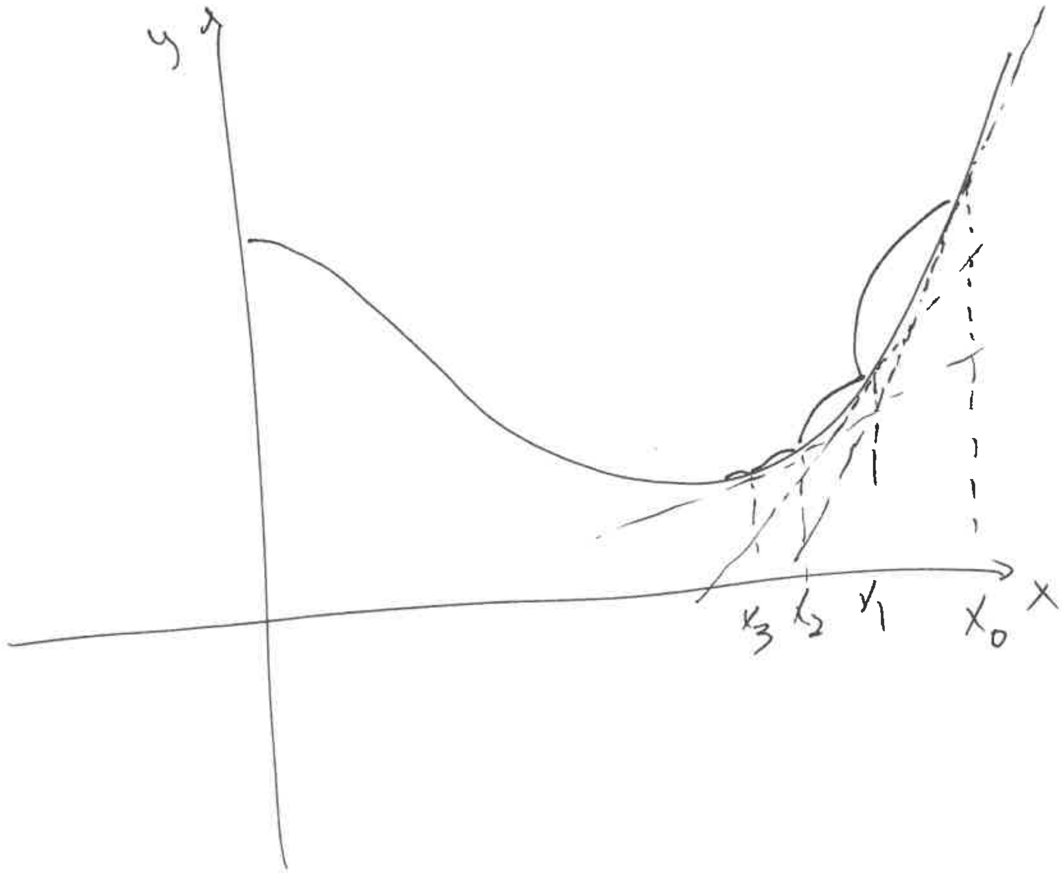
B goes through

Newton's Method

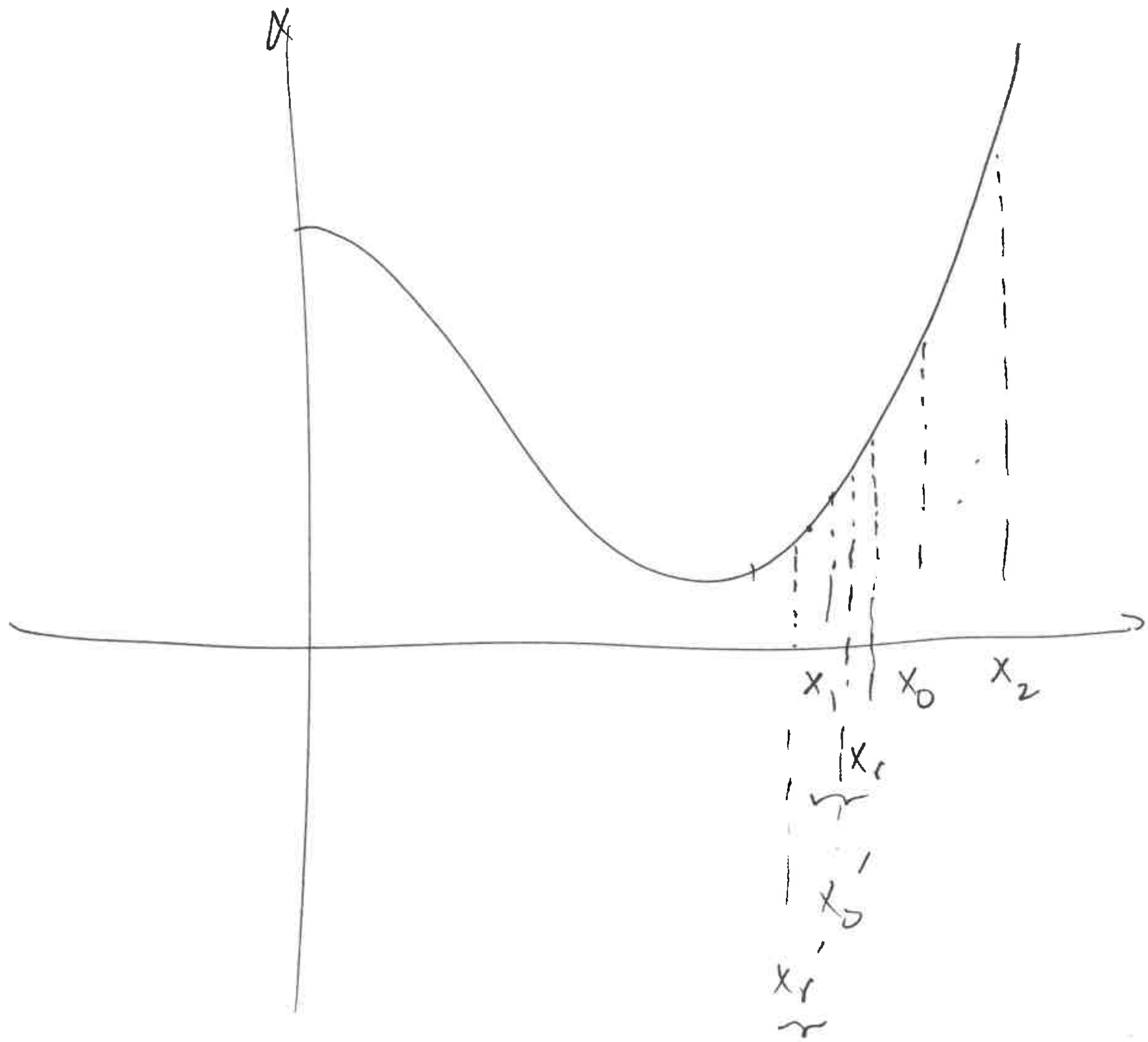
$$x_{k+1} = x_k - \frac{f'(x_k)}{f''(x_k)}$$ → divide by change in slope



Method of Steepest Descent

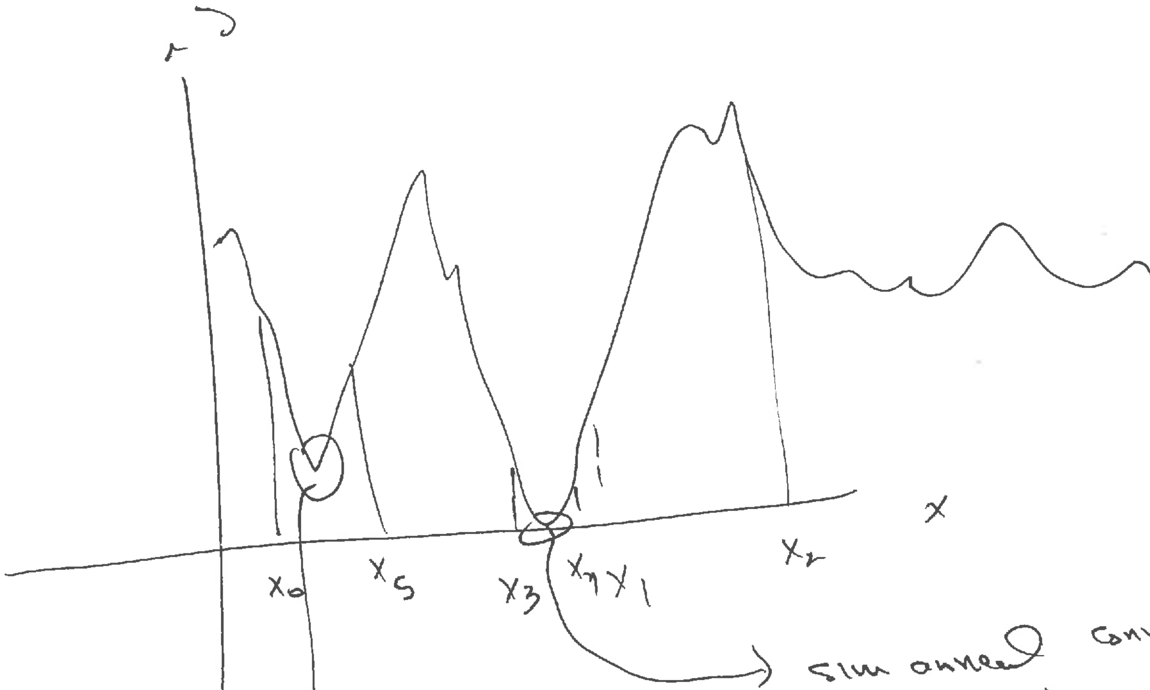


Nelder-Mead Method



→ in 2D, series of triangles...

Simulated Annealing



sim anneal converge here if # iterations large

→ random jumps

→ but more likely to stay near min

→ wikipedia has great image

Newton method gets stuck here