

A vibrant illustration of a spring scene. A large, brown tree trunk is on the left, with green leaves at the top. The background is a light yellow-green gradient. The foreground is filled with green grass, white daisies with yellow centers, and a small red ladybug. The text '2.Line Search Methods' is centered in the middle.

2.Line Search Methods

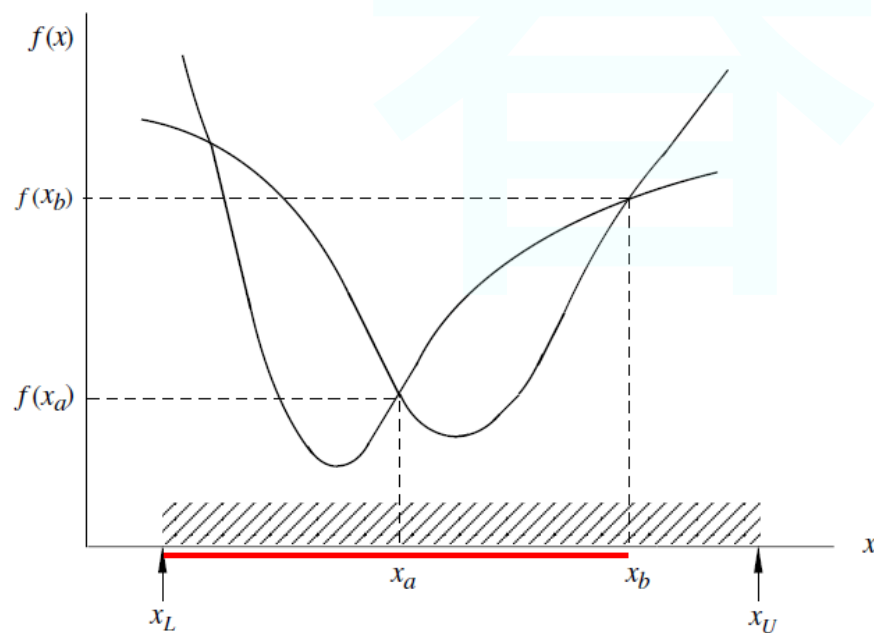
给定区间 $[x_L \quad x_U]$ 取两点 x_a, x_b

a) $f(x_a) < f(x_b)$

b) $f(x_a) > f(x_b)$

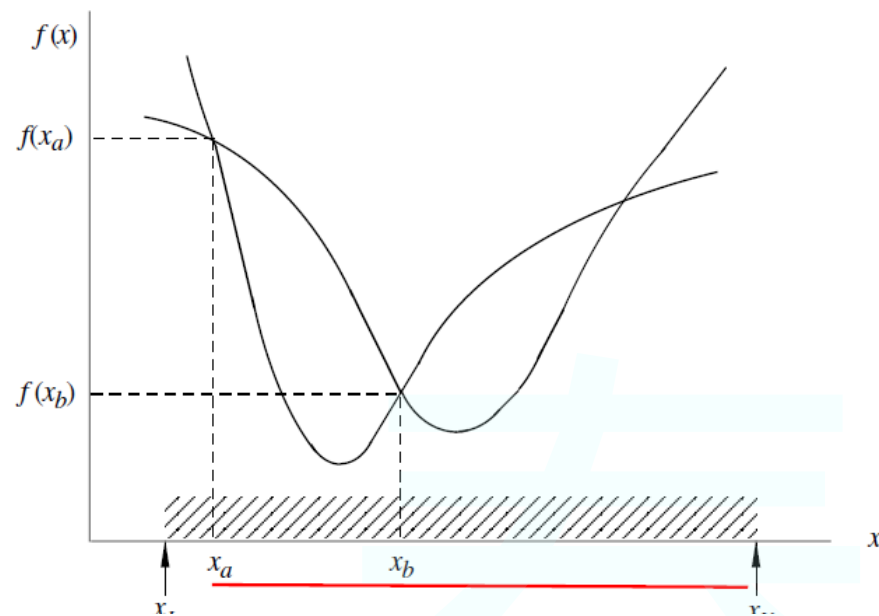
c) $f(x_a) == f(x_b)$

a) $f(x_a) < f(x_b)$



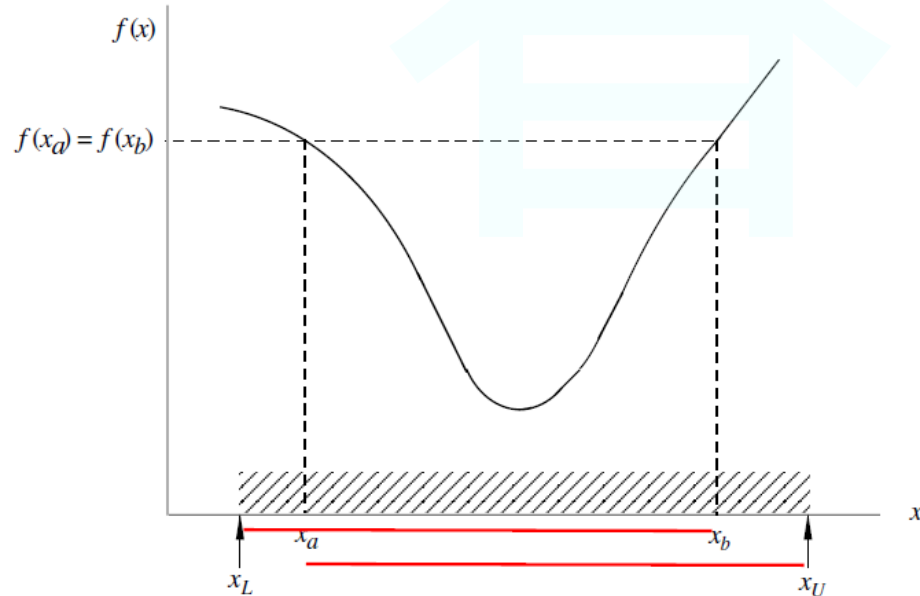
(a)

$\longrightarrow [x_L \quad x_b]$



$$b) f(x_a) > f(x_b)$$

$$\longrightarrow \begin{bmatrix} x_a & x_U \end{bmatrix}$$



$$b) f(x_a) == f(x_b)$$

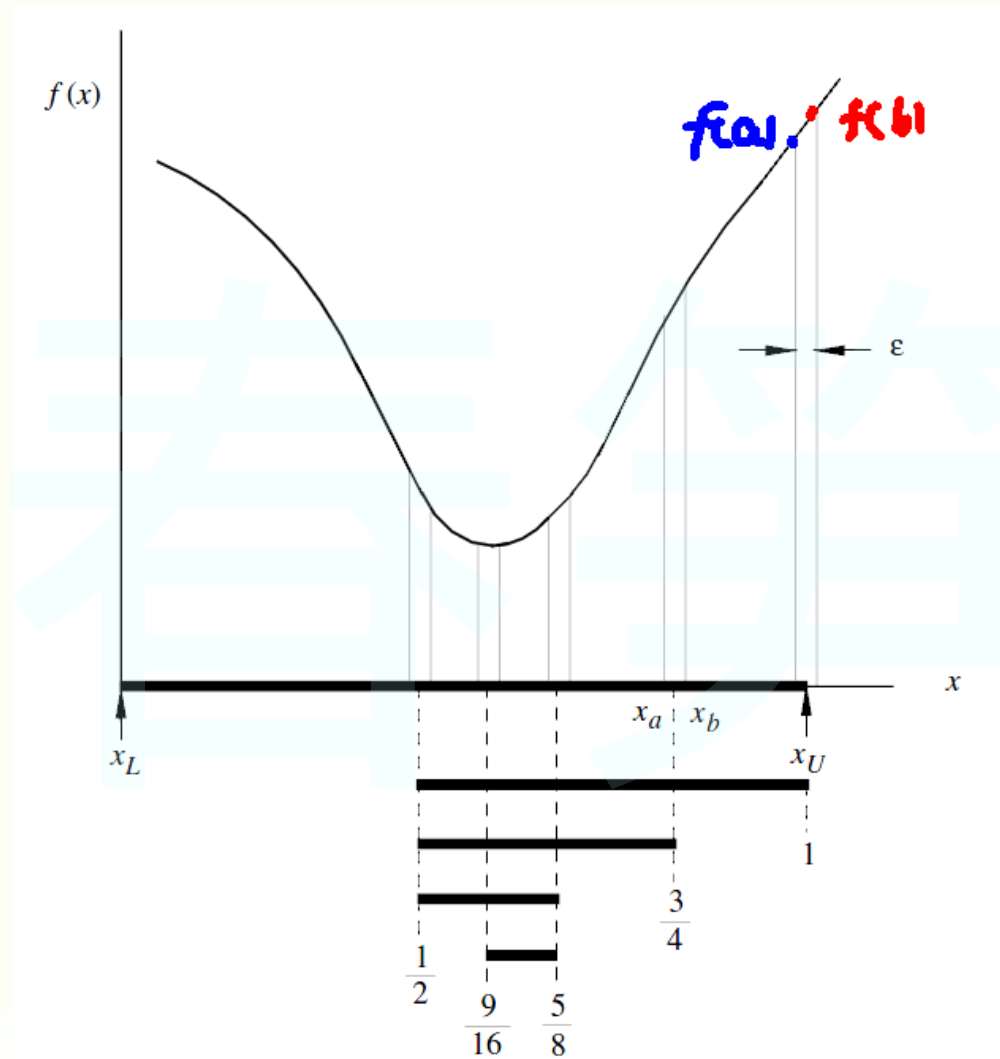
$$\longrightarrow \begin{bmatrix} x_L & x_b \end{bmatrix} \text{ or } \begin{bmatrix} x_a & x_U \end{bmatrix}$$

(c)

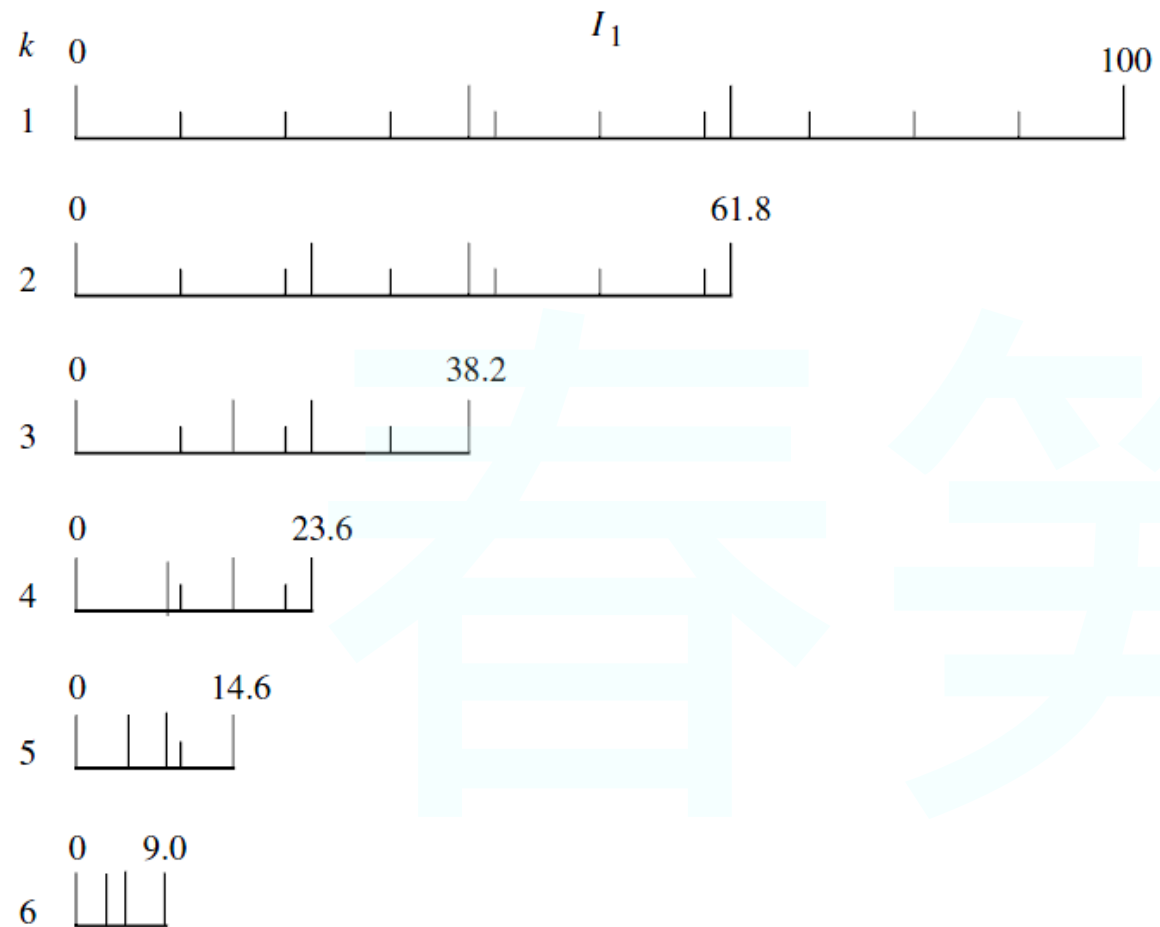
典型线搜法：

1. Dichotomous search
2. Fibonacci search
3. Golden-section search
4. Cubic interpolation method
5. Armijo
6. Wolfe

Dichotomous Search



Golden section search



Wolfe Condition

- \checkmark
 a) $q(t) \leq q(0) + m_1 t q'(0)$ and $q'(t) \geq m_2 q'(0)$ | (then terminate);
 b) $q(t) > q(0) + m_1 t q'(0)$ | (then $t_R = t$);
 c) $q(t) \leq q(0) + m_1 t q'(0)$ and $q'(t) < m_2 q'(0)$ | (then $t_L = t$).

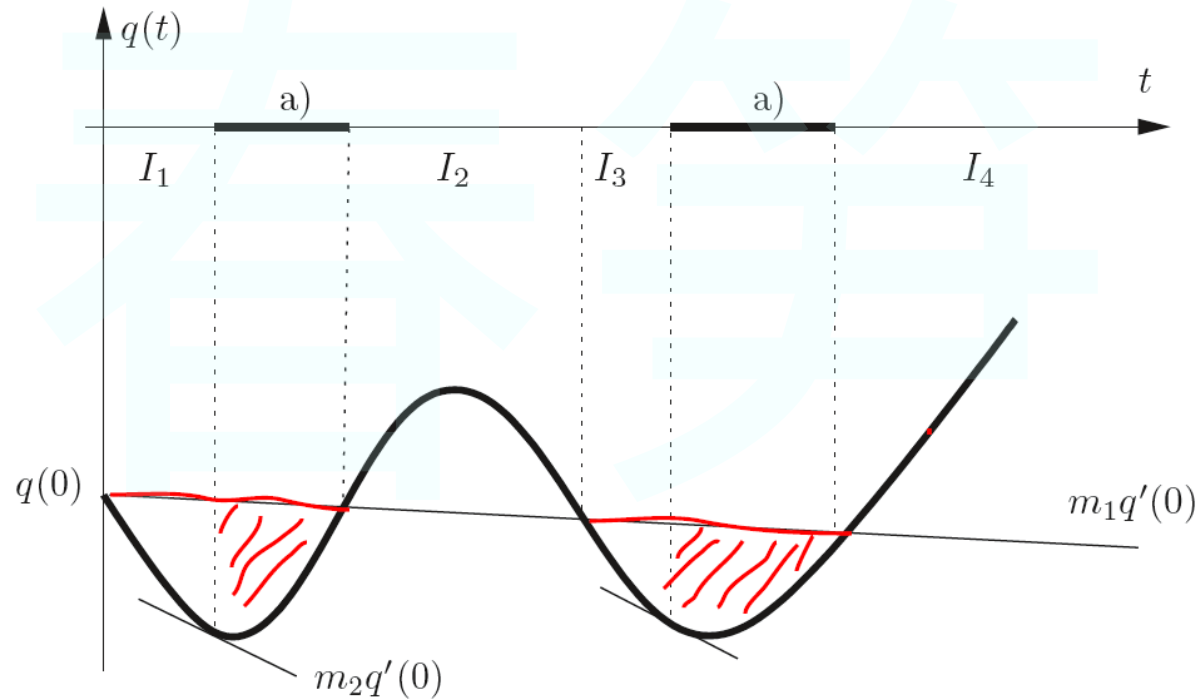


Fig. 3.2. Wolfe's rule

Armijo

- a) $q(t) \leq q(0) + m_1 t q'(0)$ | (then terminate);
- b) $q(t) > q(0) + m_1 t q'(0)$ | (then $t_R = t$);
- c) never.

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