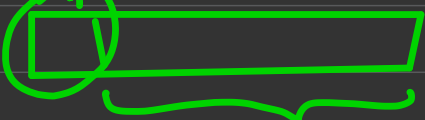


Ternary Search

Linear $\rightarrow T(n) = T(n-1) + O(1)$

new space \rightarrow *comparison*



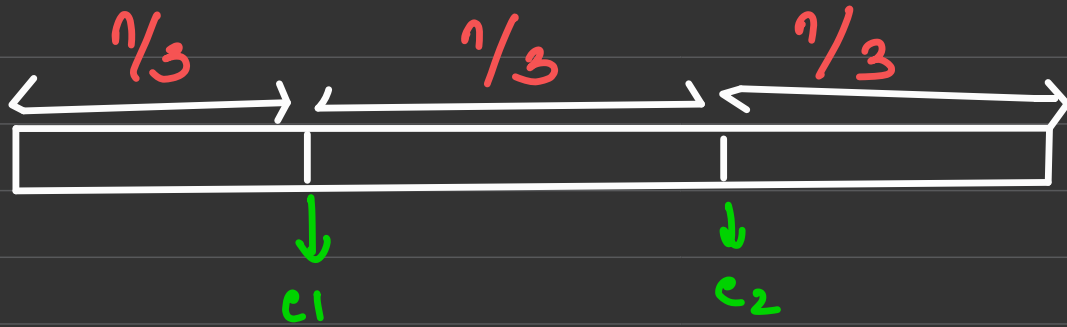
The diagram shows a horizontal rectangle representing an array of size $n-1$. The first element of the array is circled in green. A green arrow labeled "new space" points to the first element, and another green arrow labeled "comparison" points to the same element.

Binary search \rightarrow

$$T(n) = T\left(\frac{n}{2}\right) + 1 \times c$$



~~log d~~



$$T(n) = T\left(\frac{n}{3}\right) + 2 \times c \quad \leftarrow \text{scanning of } \underline{\underline{T.S}}$$

Binary Search

more iteration



$2^1 \rightarrow 2^2 \rightarrow 2^3 \rightarrow 2^4 \rightarrow 2^5 \rightarrow \dots \rightarrow 2^K$

$$\frac{n}{2^K} = 1$$

$$K = \log_2 n$$

$$O(\log n)$$

Ternary Search

$n \rightarrow \frac{n}{3} \rightarrow \frac{n}{9} \rightarrow \dots \rightarrow \frac{n}{3^{K'}}$

$$O(\log n)$$

$$\frac{n}{3^{K'}} = 1$$

$$K' = \log_3 n$$

$$T(n) = T\left(\frac{n}{2}\right) + 1 \times c$$

$$T(n/2) = T(n/4) + 1 \times c$$

$$T(n/4) = T(n/8) + 1 \times c$$

\vdots

\vdots

\vdots

$$T(2) = T(1) + 1 \times c$$

K

$$T(n) = T(1) + K \times c$$

$$K = \log_2 n$$

$$T(n) = T(n/3) + 2c$$

$$T(n/3) = T(n/9) + 2c$$

$$T(n/9) = T(n/27) + 2c$$

\vdots

\vdots

\vdots

$$T(3) = T(1) + 2c$$

K'

$$T(n) = T(1) + K' \times 2c$$

actual no. of comparison in worst case

$$\log_2 n \times \longleftrightarrow \log_3 n \times 2 \times$$

$$\log_2 n \longleftrightarrow \frac{2 \times \log_2 n}{\log_2 3}$$

actual no of comparisons are greater in
ternary Search.

For Race time

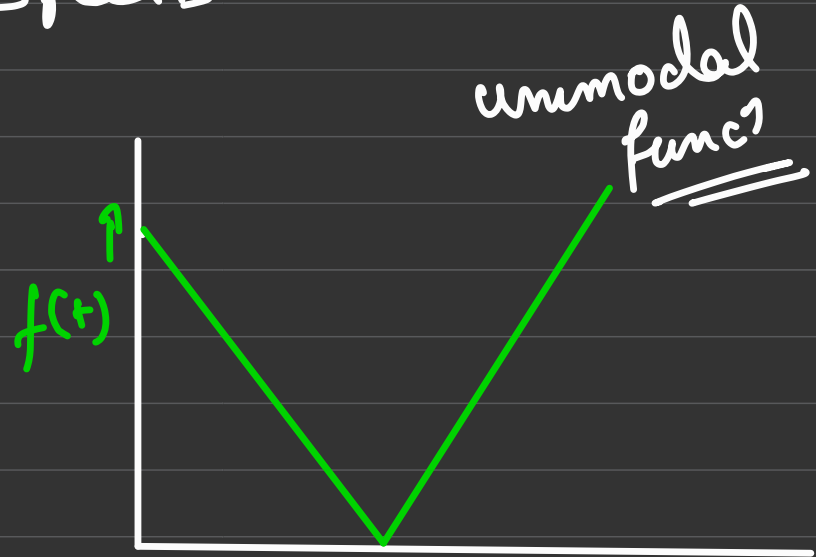
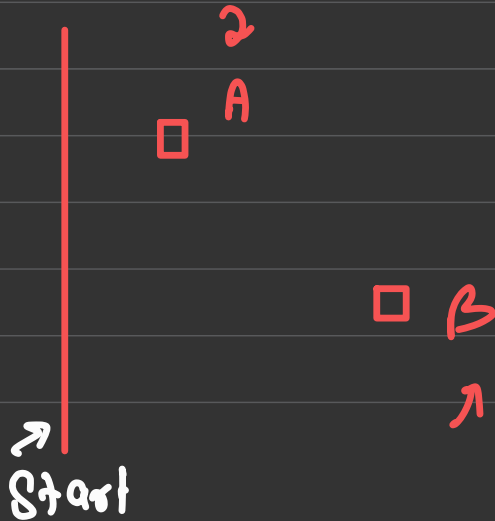
$$f(T) = \max(p_i(\tau)) - \min(p_j(\tau))$$

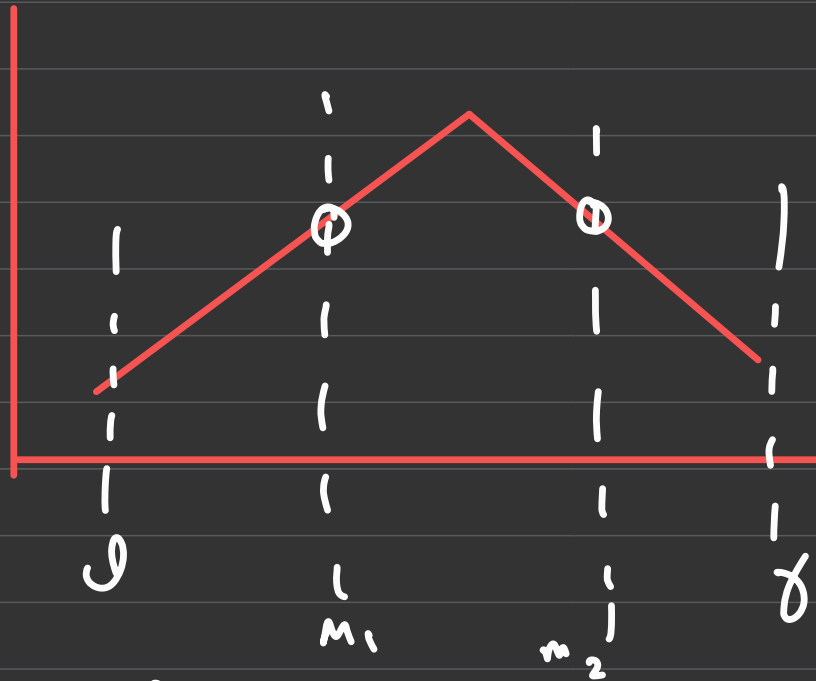
$$P_i(t) = S_i \times T + D_i$$

$f(t)$

Speed_A > Speed_B

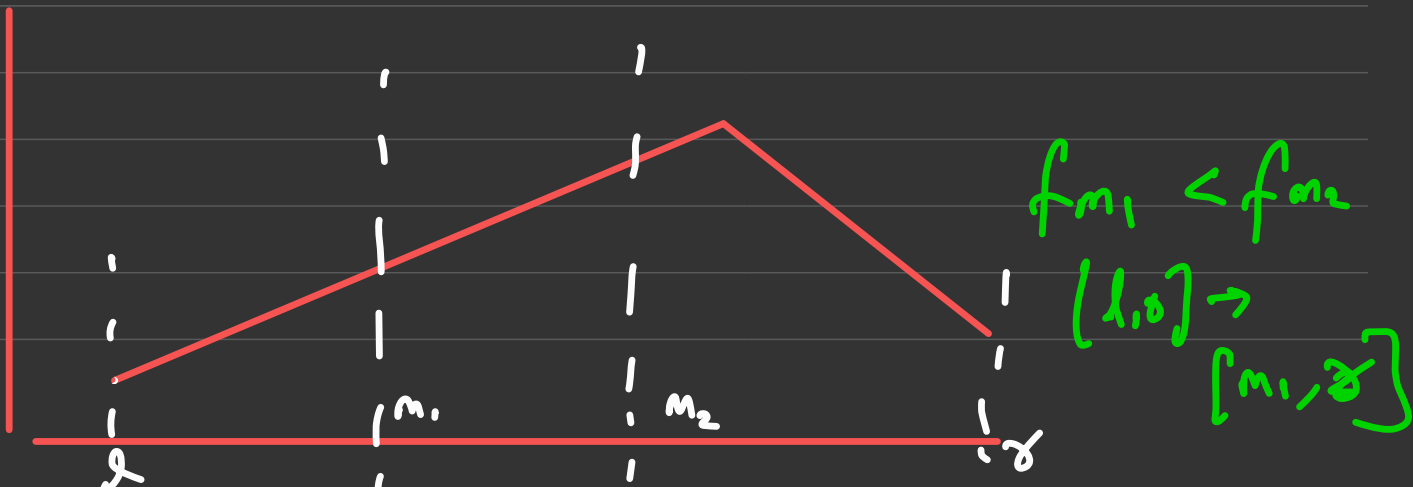
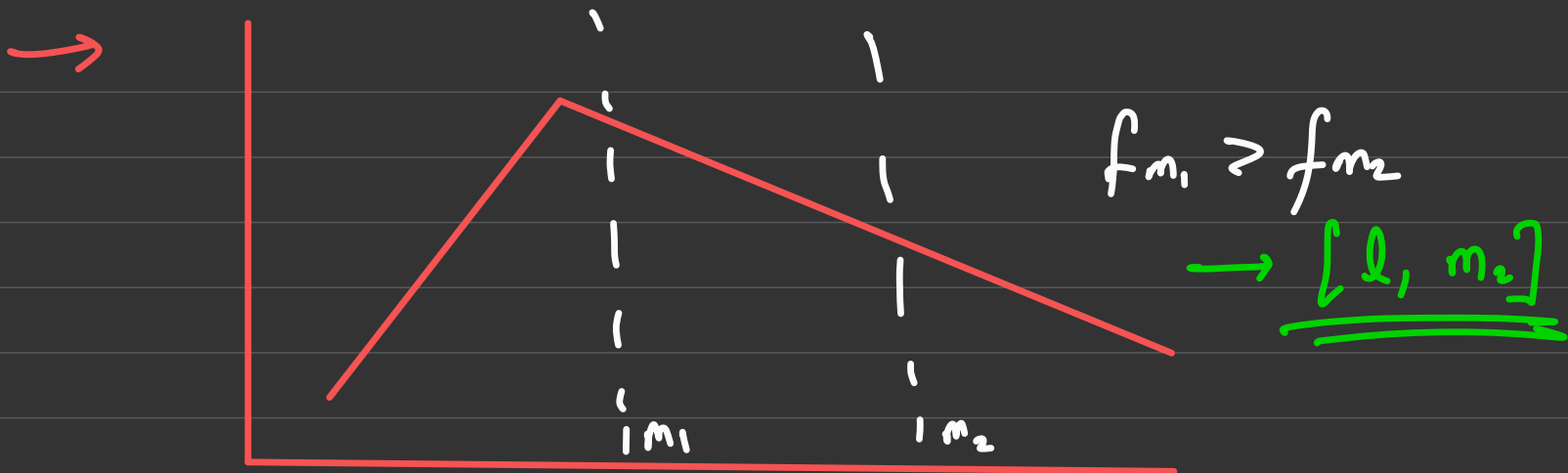
$D_A < D_B$

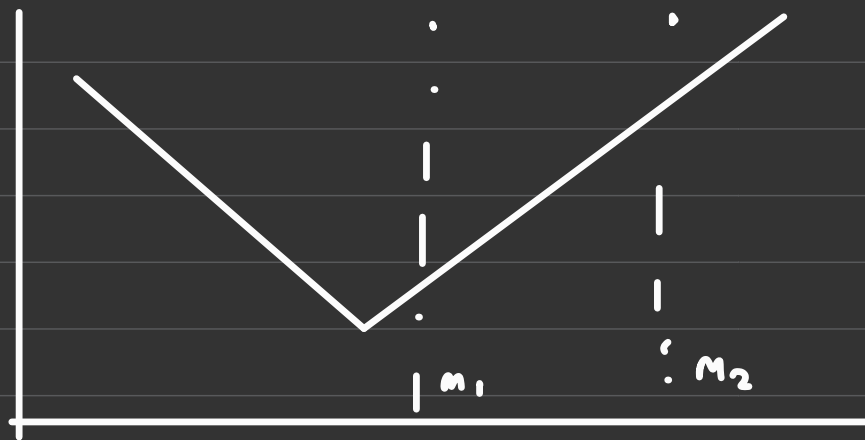




$$f(m_1) = f(m_2)$$

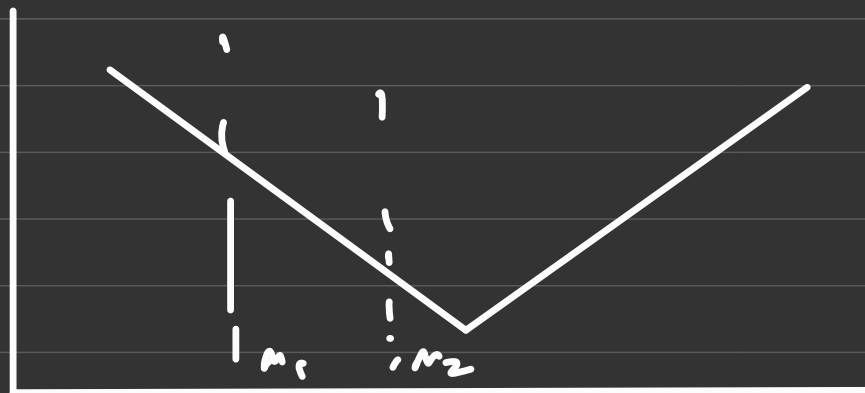
$$[a, b] \rightarrow [m_1, m_2]$$





$$f_{m_1} < f_{m_2}$$

$$\hookrightarrow [10, m_2]$$



$$f_{m_1} > f_{m_2} \longrightarrow \underline{\underline{[m_1, \sigma]}}$$