$u = |U|$ $g = |G|$ $p = |P|$ $e = |E|$

$u + g + p + e = n$ (u, g, p, e) $(n, 0, 0, 0)$

$(0, 1, 1, n-2)$

$n = |U| \quad g = |G| \quad p = |P| \quad e = |E|$

$u + g + p + e = n \qquad (u, g, p, e) \qquad (n, 0, 0, 0)$

$$\rightsquigarrow (0, 1, 1, n-2)$$

$u = |U|$ $\quad g = |G|$ $\quad p = |P|$ $\quad e = |E|$

$$u + g + p + e = n$$

(u, g, p, e) $\quad (n, 0, 0, 0) \rightsquigarrow (0, 1, 1, n-2)$

$u = |U| \qquad g = |G| \qquad p = |P| \qquad e = |E|$

$u + g + p + e = n \qquad (u, g, p, e) \qquad (n, 0, 0, 0)$

$b \in G, \quad c \in E \qquad (0, 1, 1, n-2)$

$u = |U|$ $\quad g = |G|$ $\quad p = |P|$ $\quad e = |E|$

$u + g + p + e = n$ $\qquad (u, g, p, e)$ $\qquad (n, 0, 0, 0)$

$$\downarrow$$

$b \in G$, $c \in E$ $\qquad (0, 1, 1, n-2)$

$u = |U| \quad g = |G| \quad p = |P| \quad e = |E|$

$u + g + p + e = n \qquad (u, g, p, e) \qquad (n, 0, 0, 0)$

$\downarrow$

$(0, 1, 1, n-2)$

$b \in G \ , \ c \in E$

$L[1] > L[2]$

$u=|U|$ $g=|G|$ $p=|P|$ $e=|E|$

$u+g+p+e=n$

(u,g,p,e)

$(n,0,0,0) \rightsquigarrow (0,1,1,n-2)$

$b\in G$, $c\in E$

$L[1] > L[2]$

$u = |U|$ $\quad g = |G|$ $\quad p = |P|$ $\quad e = |E|$

$u + g + p + e = n$ $\quad (u, g, p, e)$ $\quad (n, 0, 0, 0)$

$$(n,0,0,0) \rightsquigarrow (0, 1, 1, n-2)$$

$b \in G$, $c \in E$

$L[1] > L[2]$

$u = |U| \qquad g = |G| \qquad p = |P| \qquad e = |E|$

$u + g + p + e = n \qquad (u, g, p, e) \qquad (n, 0, 0, 0)$

$$\downarrow$$

$$(0, 1, 1, n-2)$$

$b \in G \quad , \quad c \in E$

$L[1] > L[2]$

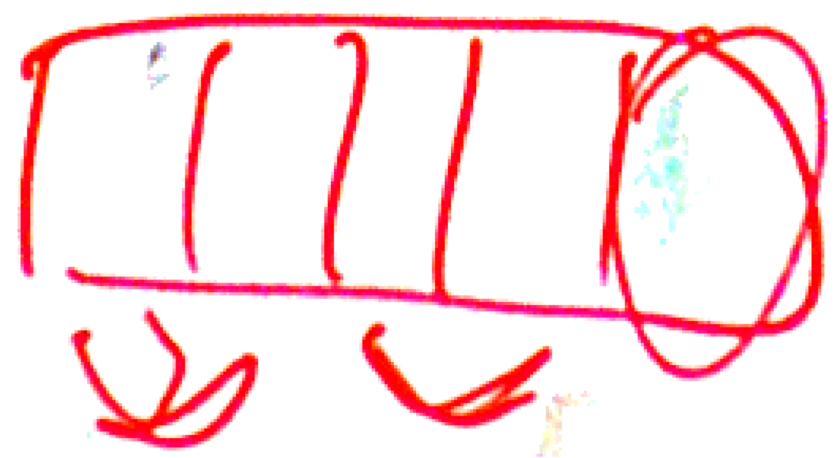
$u = |U|$ $\quad$ $g = |G|$ $\quad$ $p = |P|$ $\quad$ $e = |E|$

$u + g + p + e = n$ $\quad$ (u, g, p, e) $\quad$ $(n, 0, 0, 0)$

$\rightsquigarrow (0, 1, 1, n-2)$

$b \in G$, $c \in E$ $\quad$ P . .

$L[1] > L[2]$



G . .

$u = |U|$ $g = |G|$ $p = |P|$ $e = |E|$

$u + g + p + e = n$

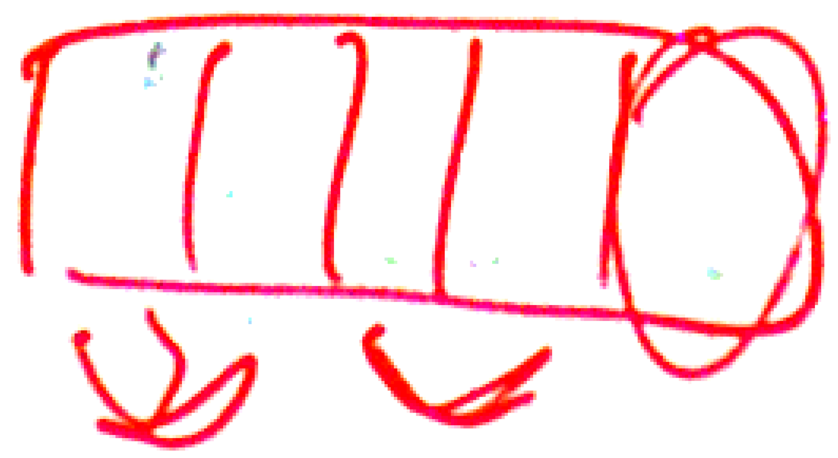
(u, g, p, e)

$$(n, 0, 0, 0) \rightsquigarrow (0, 1, 1, n-2)$$

$b \in G$, $c \in E$

$P \ldots$

$L[1] > L[2]$



$G \ldots$

$u = |U|$ $g = |G|$ $p = |P|$ $e = |E|$

$u + g + p + e = n$

(u, g, p, e)

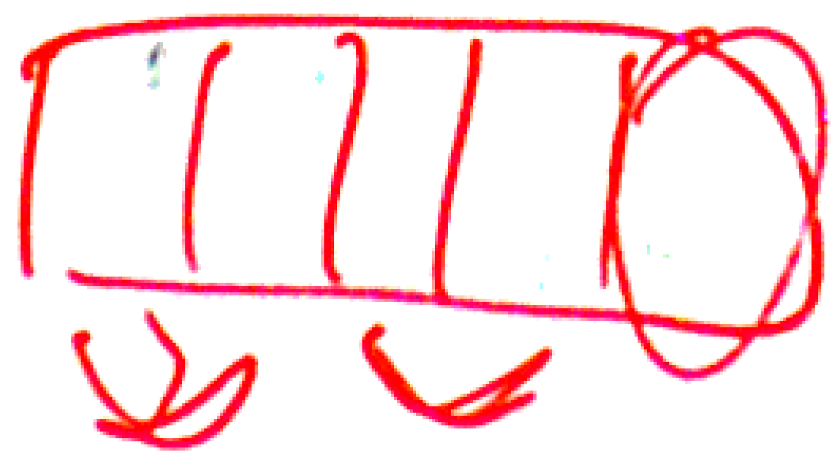
$(n, 0, 0, 0)$

$(0, 1, 1, n-2)$

$b \in G$, $c \in E$

P . .

$L[1] > L[2]$



$\frac{n}{2}$

G . .

$u=|U|$ $\quad g=|G|$ $\quad p=|P|$ $\quad e=|E|$

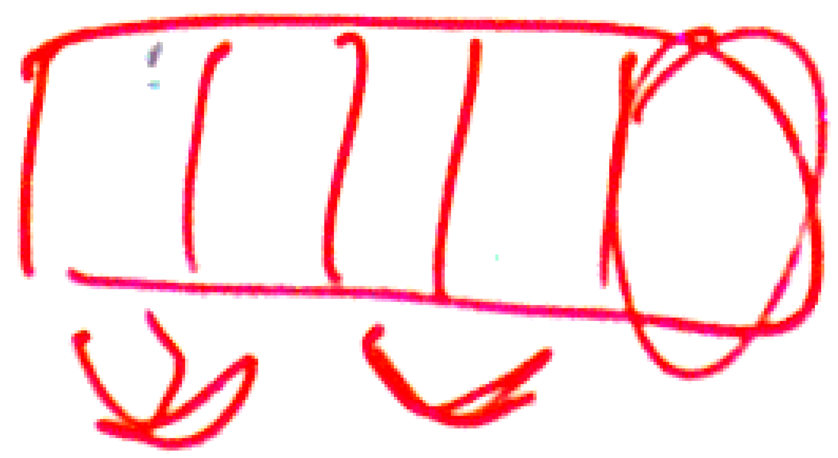
$u+g+p+e=n$

(u,g,p,e)

$b\in G$, $c\in E$

$L[1] > L[2]$

P . .



G . .

$$(n,0,0,0) \rightsquigarrow \left(0,\tfrac{n}{2},\tfrac{n}{2},0\right) \rightsquigarrow (0,1,1,n-2)$$

$u = |U| \quad g = |G| \quad p = |P| \quad e = |E|$

$u + g + p + e = n$

(u, g, p, e)

$(n, 0, 0, 0)$

$\downarrow$

$(0, \frac{n}{2}, \frac{n}{2}, 0)$

$\downarrow$

$(0, 1, 1, n-2)$

$b \in G, \quad c \in E$

$p \ldots$

$L[1] > L[2]$

$$\frac{n}{2} + 2\left(\frac{n}{2} - 1\right)$$

$$= \frac{3n}{2} - 2$$

$n = |U| \quad g = |G| \quad p = |P| \quad e = |E| \quad \Omega(n^{\log\log n})$

$u + g + p + e = n \qquad (u, g, p, e) \qquad (n, 0, 0, 0)$

$b \in G \,, \; c \in E \qquad p \,.\,.$

$(0, \frac{n}{2}, \frac{n}{2}, 0)$

$L[1] > L[2] \qquad \frac{n}{2} + 2\left(\frac{n}{2} - 1\right)$

$\Omega(2^n) \qquad = \frac{3n}{2} - 2 \qquad \Omega(n^{\log n})$

$(0, 1, 1, n-2)$

$u = |U|$ $g = |G|$ $p = |P|$ $e = |E|$ $\Omega(n^{\log \log n})$

$u + g + p + e = n$ (u, g, p, e) $(n, 0, 0, 0)$

$b \in G$, $c \in E$ p . .

$(0, \frac{n}{2}, \frac{n}{2}, 0)$

$L[1] > L[2]$ $\frac{n}{2} + 2\left(\frac{n}{2} - 1\right)$

$\Omega(2^n)$ $= \frac{3n}{2} - 2$ $\Omega(n^{\log n})$ $(0, 1, 1, n-2)$

$u = |U| \quad g = |G| \quad p = |P| \quad e = |E| \qquad \Omega(n^{\log\log n})$

$u + g + p + e = n \qquad (u, g, p, e) \qquad (n, 0, 0, 0)$

$b \in G, \quad c \in E \qquad p \ldots$

$\left(0, \frac{n}{2}, \frac{n}{2}, 0\right)$

$L[1] > L[2] \qquad \frac{n}{2} + 2\left(\frac{n}{2} - 1\right)$

$\Omega(2^n) \qquad = \frac{3n}{2} - 2 \qquad \Omega(n^{\log n})$

$(0, 1, 1, n-2)$

n

$b \in$

$\Omega\left(n^{\log \log n}\right)$

$(n, 0, 0, 0)$

$\left(0, \frac{n}{2}, \frac{n}{2}, 0\right)$

$\log n$

$(0, 1, 1, n-2)$

n

$L[1] > L[2]$

Si NO

$b \in$

$$\Omega\left(n^{\log \log n}\right)$$

$$L[1] > L[L[3]]$$

n

$b \in$

$L[1] > L[2]$

si

NO

$\Omega(n^{\log \log n})$

$L[1] > L[L[3]]$

n

$\Omega(n^{\log \log n})$

$L[1] > L[2]$

$L[1] > L[L[3]]$

si

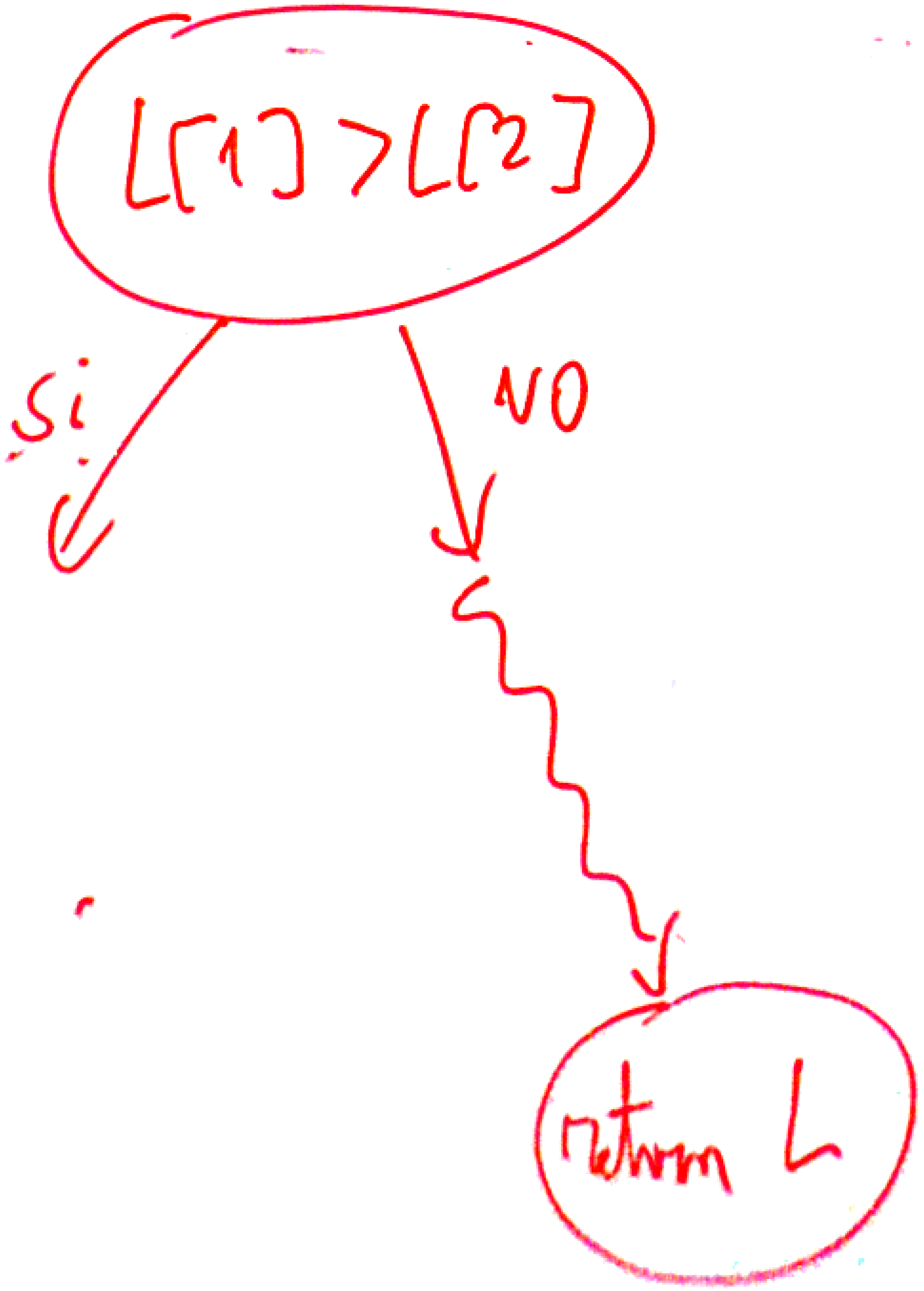
NO

$b \in$

return L

n

$b \in$



$\Omega(n^{\log \log n})$

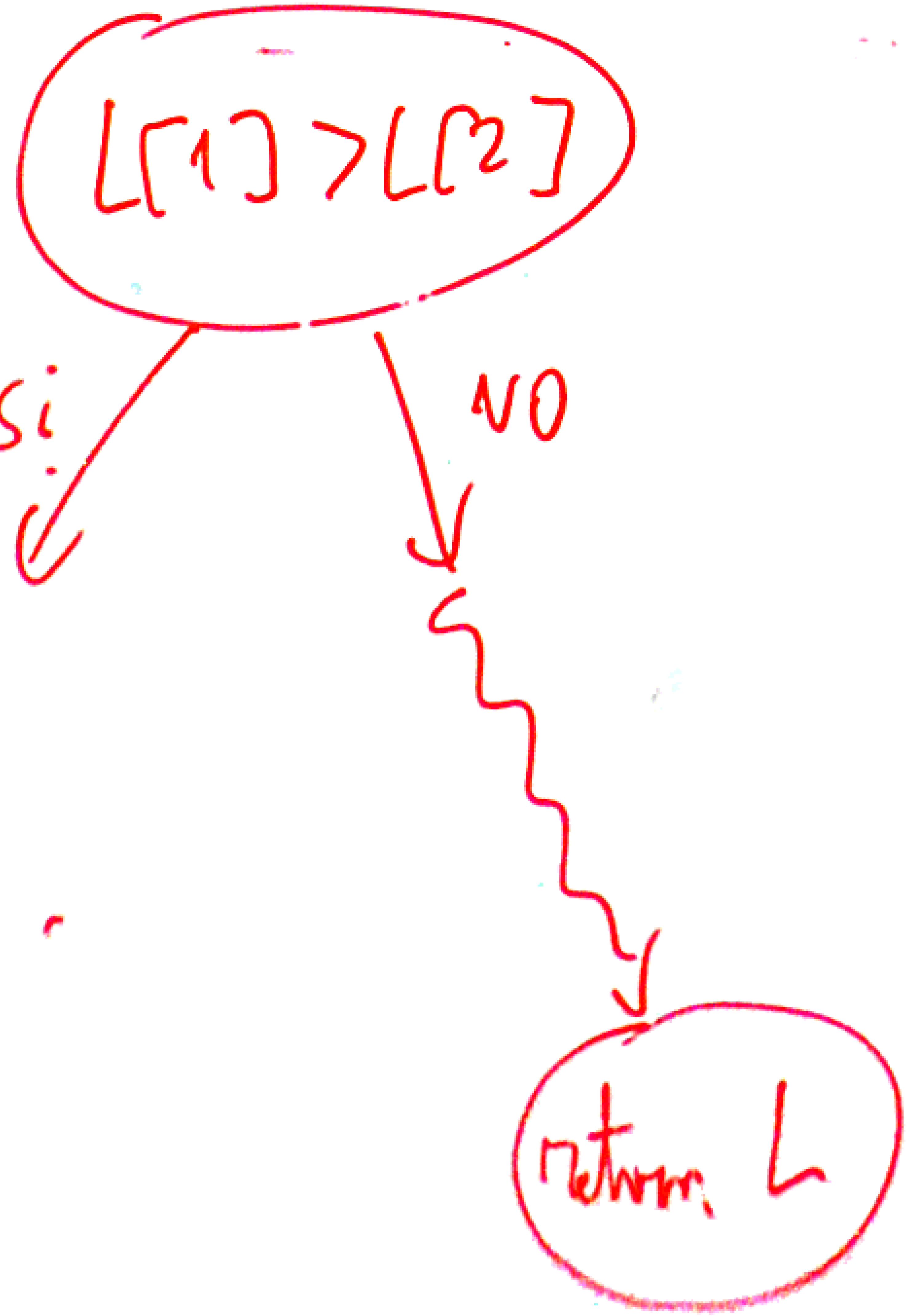
$L[1] > L[L[3]]$

n

$\Omega(n^{\log\log n})$

$L[1] > L[L[3]]$

b ∈

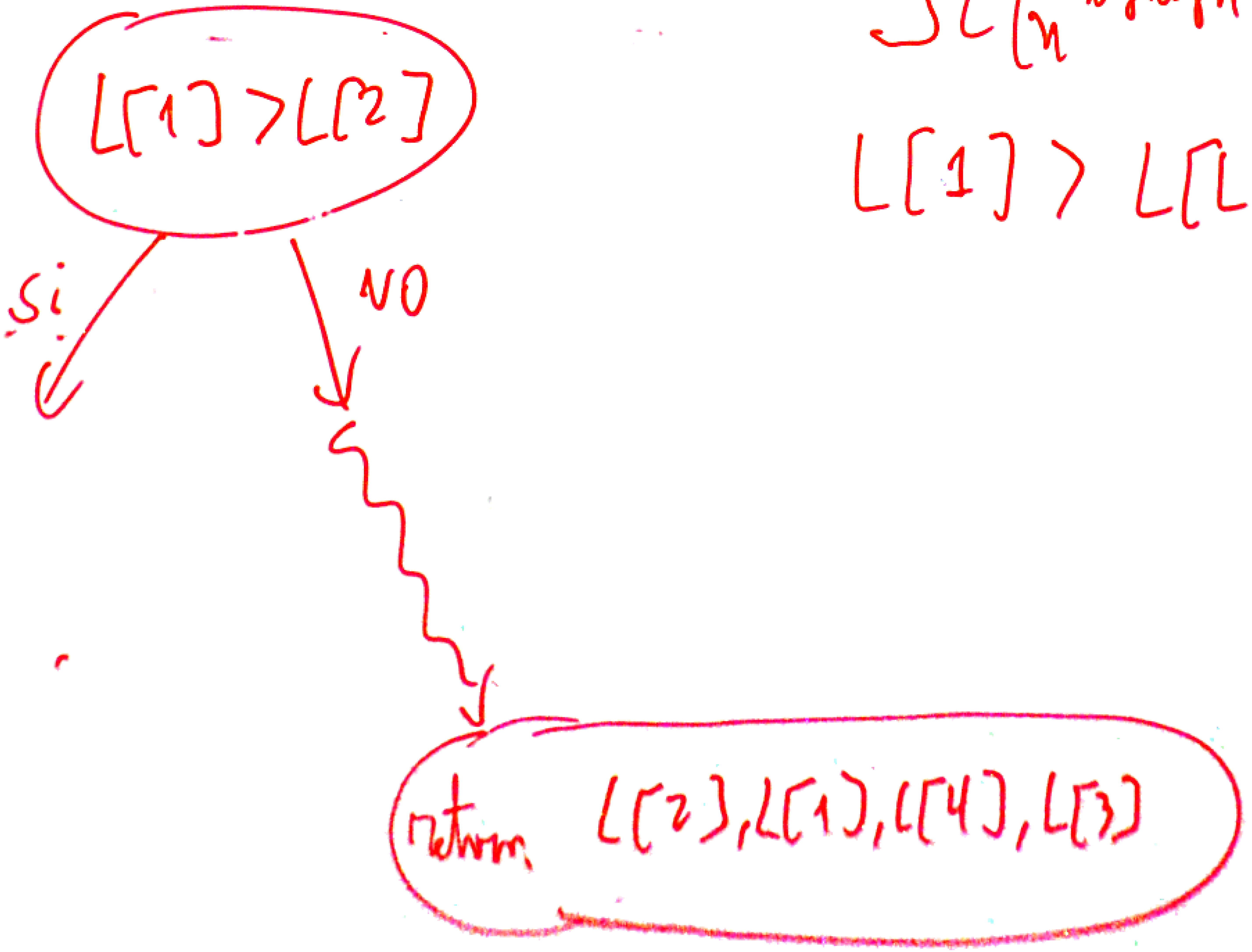


n

$\Omega(n^{\log\log n})$

$L[1] > L[L[3]]$

$b \in$



n

$L[1] > L[2]$

si

NO

$b \in$

return $L[2], L[1], L[4], L[3]$

$\Omega(n^{\log\log n})$

$L[1] > L[L[3]]$

$2^p \geq n!$

n

$L[1] > L[2]$

si

NO

$b \in$

return $L[2], L[1], L[4], L[3]$

$\Omega(n^{\log \log n})$

$L[1] > L[L[3]]$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

$\log n! \in \Theta(n \log n)$

n

L[1] > L[2]

si

NO

$b \in$

return L[2],L[1],L[4],L[3]

$2^n \le n! \le n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \le n!$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

n

$L[1] > L[2]$

si

NO

$b \in$

$T_{A,n}$

return $L[2], L[1], L[4], L[3]$

$\log n! \in \Theta(n \log n)$

$2^n \leq n! \leq n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

$\log n! \in \Theta(n \log n)$

n

$L[1] > L[2]$

si → $T_{A,n}$

NO → return $L[2], L[1], L[4], L[3]$

$b \in$

$2^n \leq n! \leq n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

n

$\log n! \in \Theta(n \log n)$

$L[1] > L[2]$

si → $T_{A,n}$

NO → return $L[2], L[1], L[4], L[3]$

$b \in$

$2^n \leq n! \leq n^n$

$\geq$

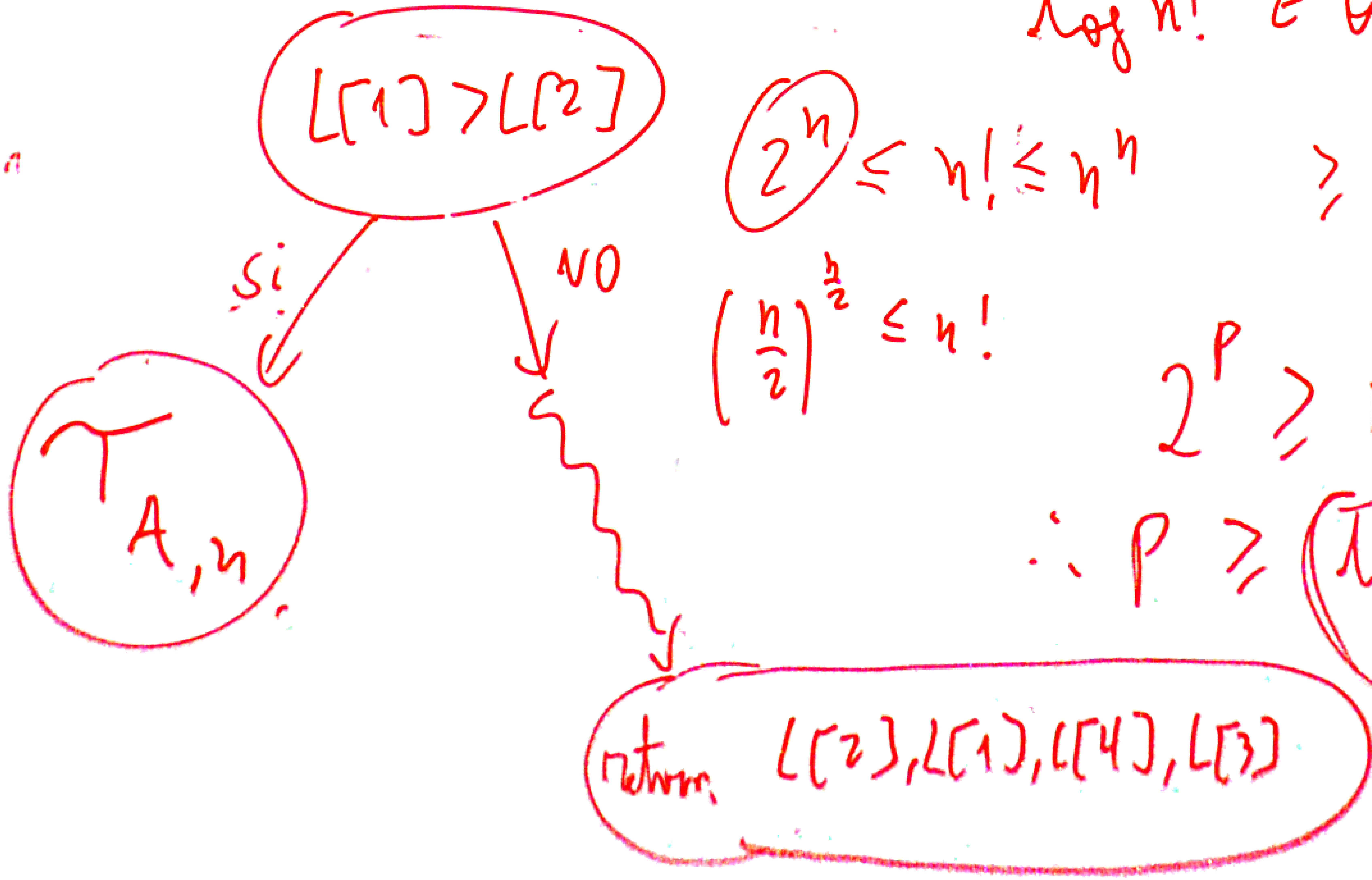
$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$\therefore\ p \geq \log_2 n!$

n

$b \in$



$$\log n! \in \Theta(n \log n)$$

$$2^n \leq n! \leq n^n$$

$$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$$

$$2^p \geq n!$$

$$\therefore p \geq \log_2 n!$$

$\log n! \in \Theta(n \log n)$

n

$L[1] > L[2]$

si → $T_{A,n}$

NO → return $L[2], L[1], L[4], L[3]$

$b \in$

$2^n \leq n! \leq n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

n

$$\log n! \in \Theta(n \log n)$$

b $\in$

$$\begin{tikzcd}
 & L[1] > L[2] \arrow[dl, "si"'] \arrow[dr, squiggly, "NO"] & \\
T_{A,n} & & \text{return } L[2], L[1], L[4], L[3]
\end{tikzcd}$$

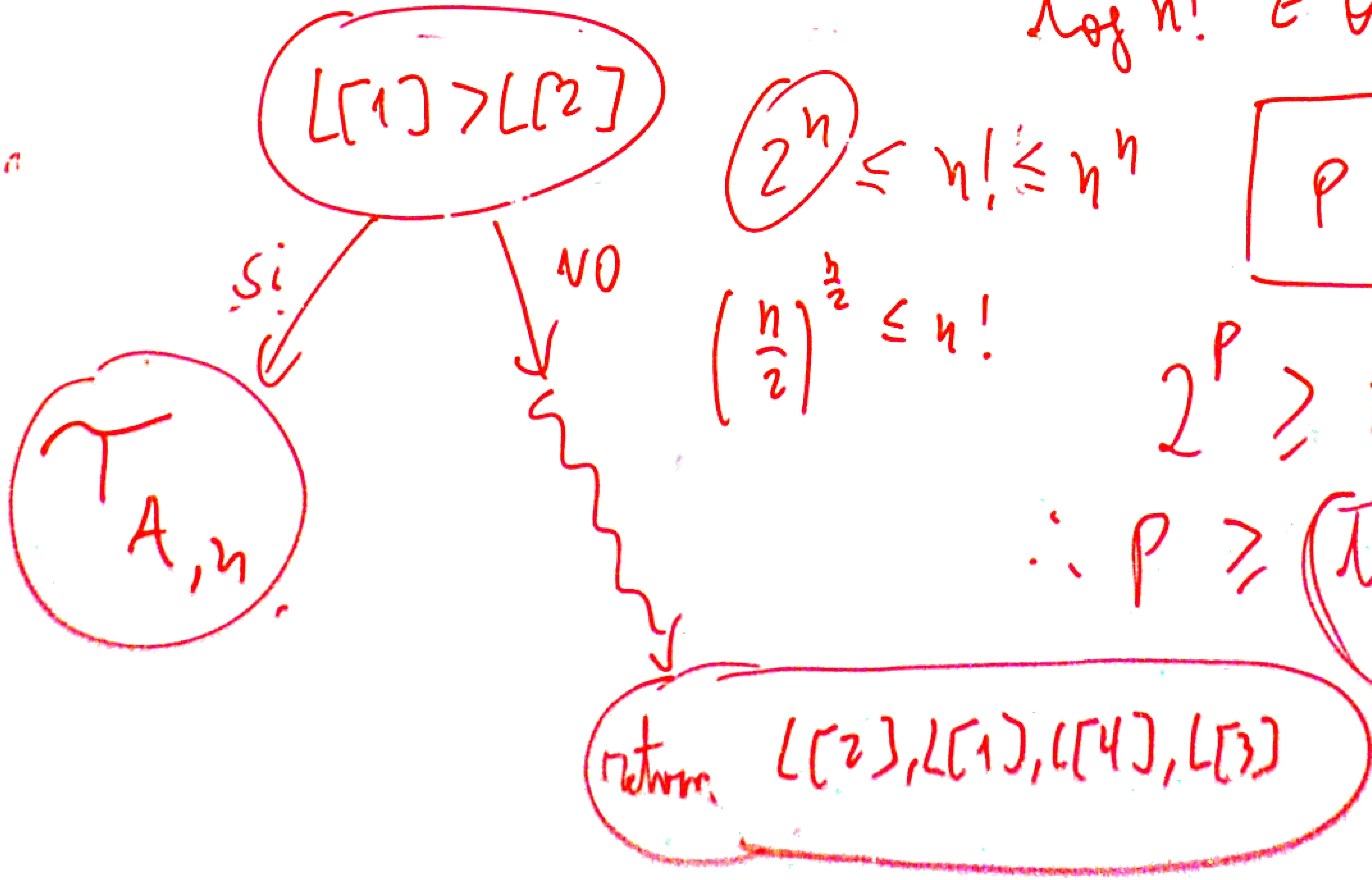
$$2^n \leq n! \leq n^n \qquad \geq$$

$$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$$

$$2^p \geq n!$$

$$\therefore p \geq \log_2 n!$$

n



$b \in$

$\log n! \in \Theta(n \log n)$

$2^n \le n! \le n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \le n!$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

n

$\log n! \in \Theta(n \log n)$

$L[1] > L[2]$

$2^n \leq n! \leq n^n$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

si

NO

$b \in$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$T_{A,n}$

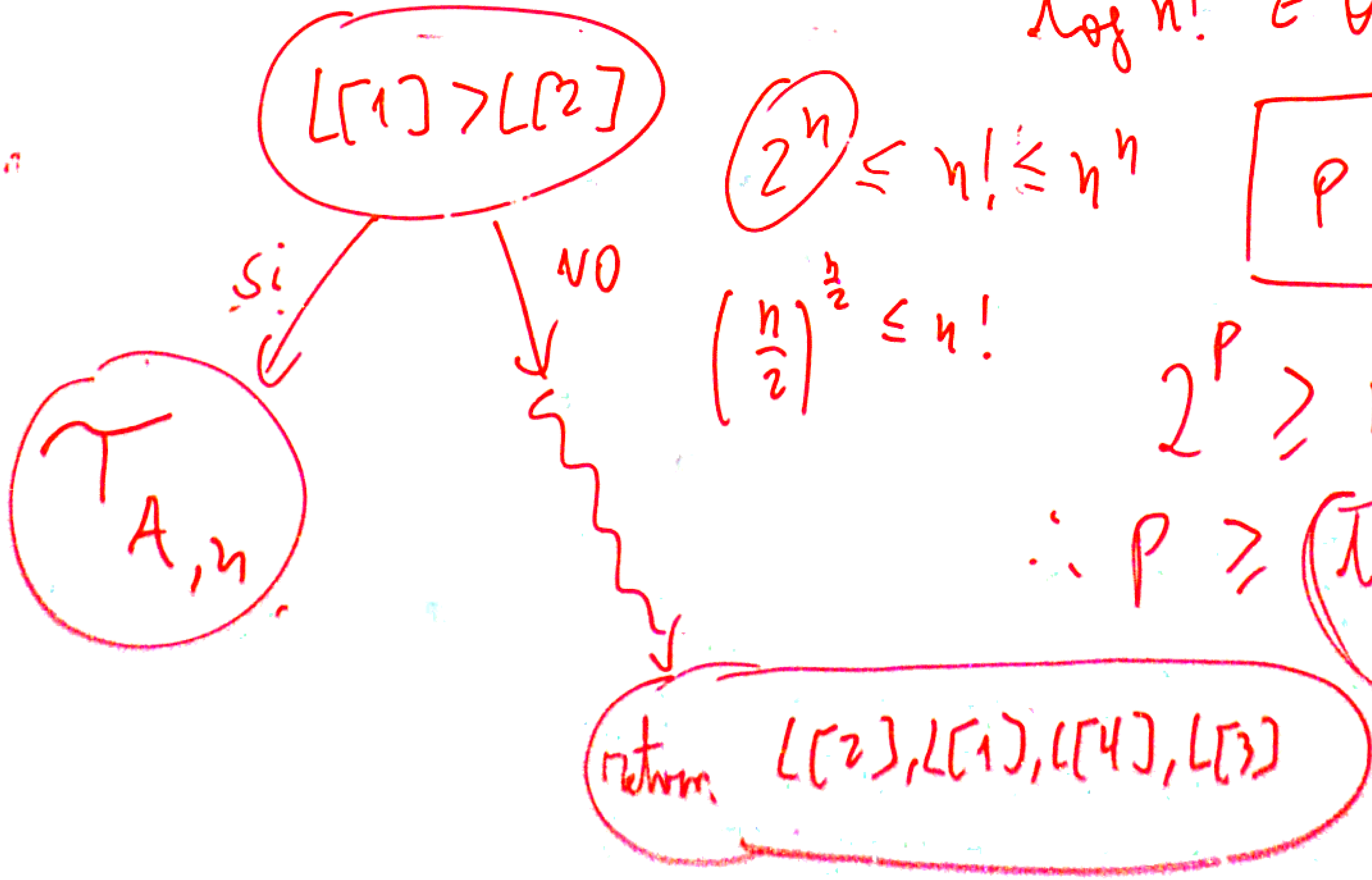
$2^p \geq n!$

$\therefore\ p \geq \log_2 n!$

return $L[2], L[1], L[4], L[3]$

$L[1] < L[2] < L[3]$

bi



$$\log n! \in \Theta(n \log n)$$

$$2^n \leq n! \leq n^n$$

$$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$$

$$\boxed{p \geq \lceil \log_2(n+1) \rceil}$$

$$2^p \geq n!$$

$$\therefore p \geq \log_2 n!$$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$L[1] > L[2]$

si: $T_{A,n}$

NO: return $L[2], L[1], L[4], L[3]$

bi

$2^n \leq n! \leq n^n$

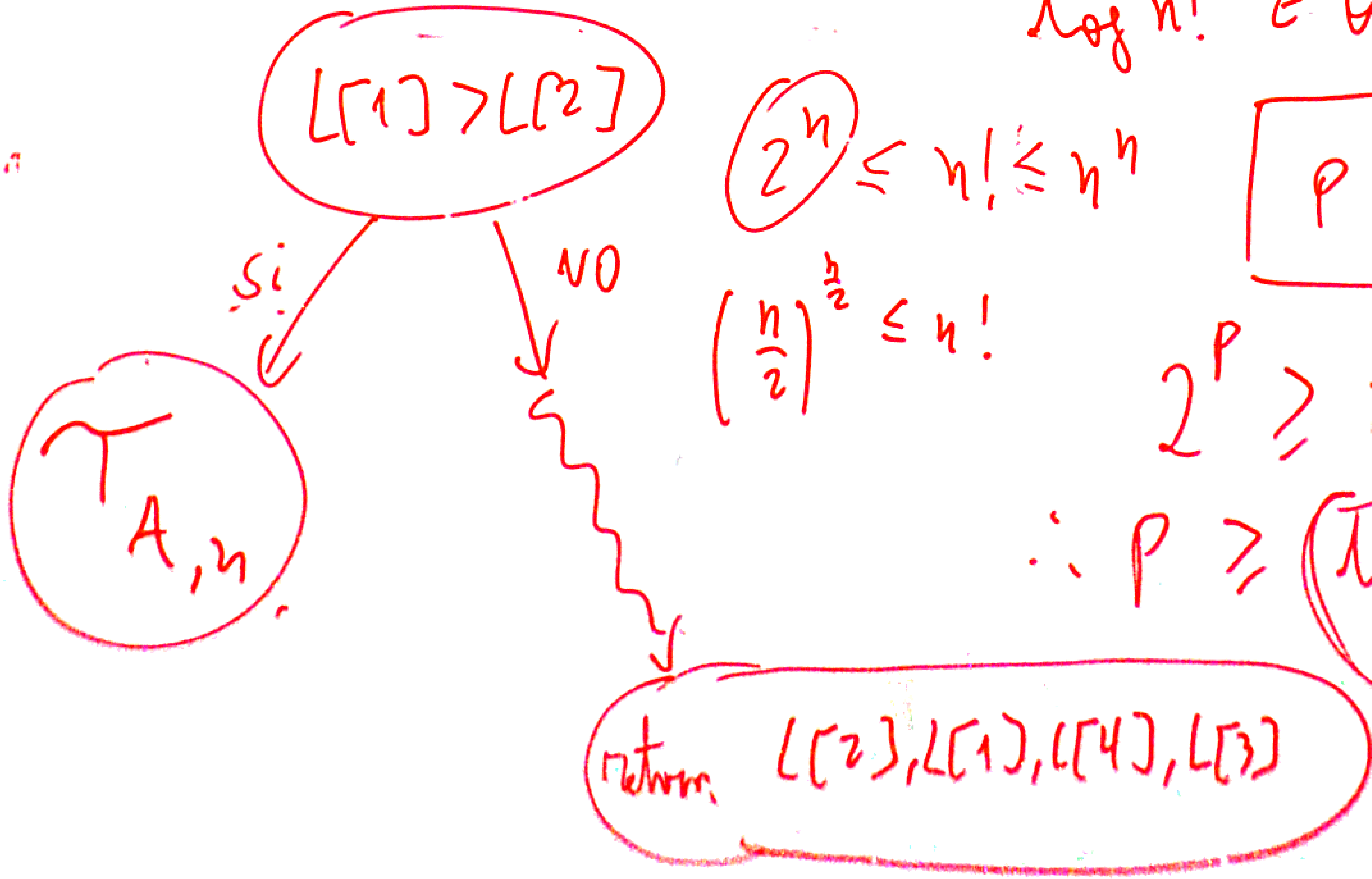
$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$$

$2^p \geq n!$

$\therefore p \geq \log_2 n!$

$L[1] < L[2] < L[3]$



bi

$$\log n! \in \Theta(n \log n)$$

$$2^n \leq n! \leq n^n$$

$$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$$

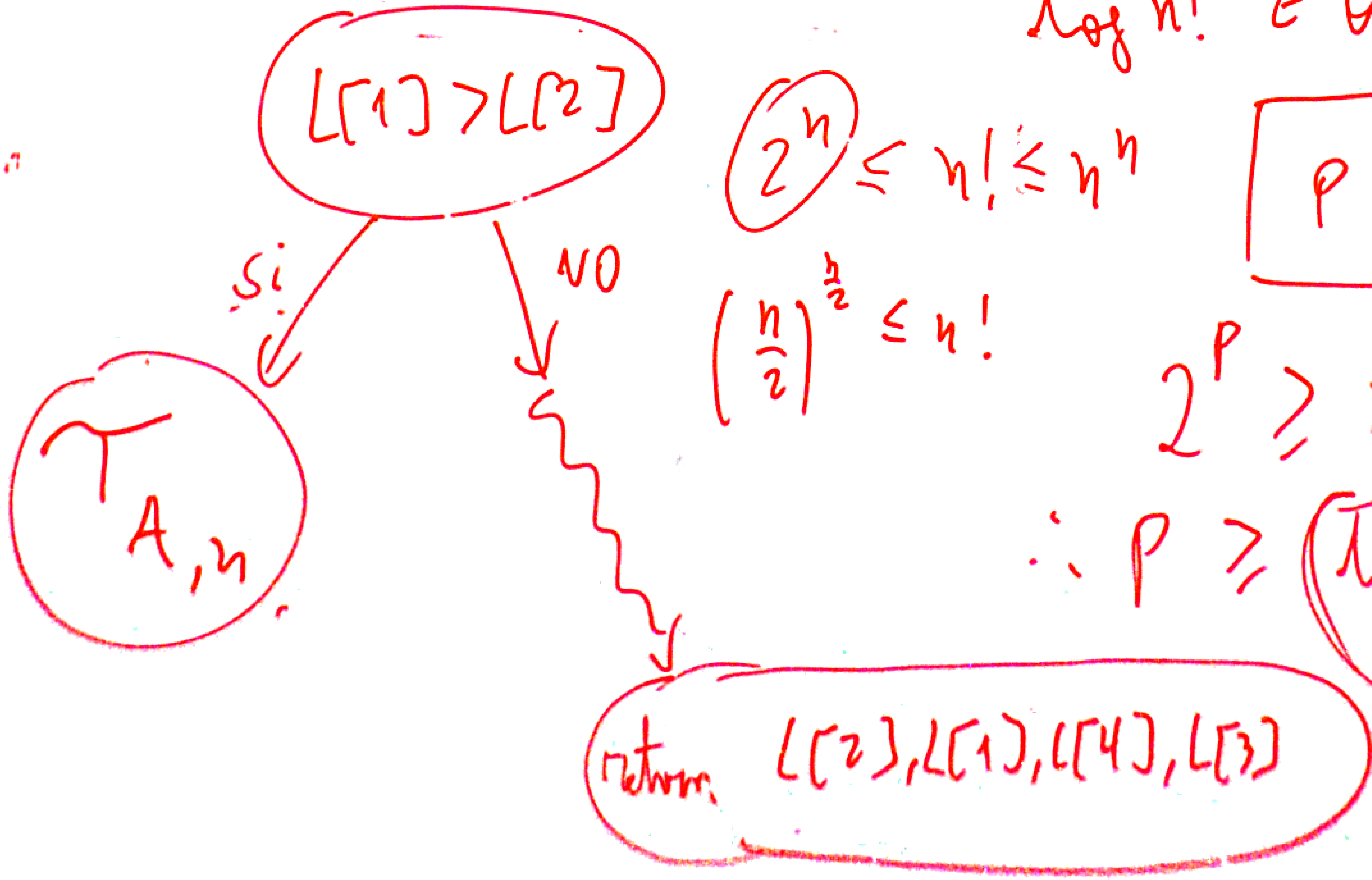
$$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$$

$$2^p \geq n!$$

$$\therefore p \geq \log_2 n!$$

L[1]< L[2]< L[3]

bi



$\log n! \in \Theta(n \log n)$

$2^n \le n! \le n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \le n!$

$\boxed{p \ge \lceil \log_2 (n+1) \rceil}$

$2^p \ge n!$

$\therefore p \ge \log_2 n!$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

bi

$f(n) \in O(n)$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] > L[2]$

si: $T_{A,n}$

NO: return $L[2], L[1], L[4], L[3]$

$\log n! \in \Theta(n \log n)$

$2^n \leq n! \leq n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$$\boxed{p \geq \lceil \log_2(n+1) \rceil}$$

$2^p \geq n!$

$2n \in O(n)$

$\log n \in O(n)$ $\therefore$ $p \geq \log_2 n!$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si

NO

$T_{A,n}$

return $L[2], L[1], L[4], L[3]$

bi-

$f(n) \in O(n)$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$\log n! \in \Theta(n \log n)$

$2^n \leq n! \leq n^n$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$2n \in O(n)$

$\log n \in O(n)$ $\therefore$ $p \geq \log_2 n!$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

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NO: return $L[2], L[1], L[4], L[3]$

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$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2n \in O(n)$

$\log n \in O(n)$

$\log n! \in \Theta(n \log n)$

$$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$$

$2^p \geq n!$

$p \geq \log_2 n!$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si

NO

bi

$T_{A,n}$

$f(n) \in O(n)$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

return $L[2], L[1], L[4], L[3]$

$\log n! \in \Theta(n \log n)$

$2^n \leq n! \leq n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2n \in O(n)$

$\log n \in O(n)$

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$2^p \geq n!$

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$L[1] < L[2] < L[3]$

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$L[1] > L[2]$

si

NO

$T_{A,n}$

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$2^n \leq n! \leq n^n$

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$2n \in O(n)$

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$\therefore \; p \geq \log_2 n!$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

$2^n \leq n! \leq n^n$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

si

NO

bi

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$T_{A,n}$

$2^p \geq n!$

$f(n) \in O(n)$

$2n \in O(n)$

$\log n \in O(n)$

$\therefore p \geq \log_2 n!$

return $L[2], L[1], L[4], L[3]$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si

NO

$T_{A,n}$

return $L[2], L[1], L[4], L[3]$

bi

$f(n) \in O(n)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$\log n! \in \Theta(n \log n)$

$2^n \leq n! \leq n^n$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$2n \in O(n).$

$\log n \in O(n)$ $\therefore$ $p \geq \log_2 n!$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

si

NO

$T_{A,n}$

return $L[2], L[1], L[4], L[3]$

$2^n \leq n! \leq n^n$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

bi

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$f(n) \in O(n)$

$2n \in O(n)$

$\log n \in O(n)$

$\therefore \; p \geq \log_2 n!$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

si

NO

$2^n \leq n! \leq n^n$

$p \geq \lceil \log_2(n+1) \rceil$

bi

$T_{A,n}$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2^p \geq n!$

$2n \in O(n)$

$f(n) \in O(n)$

$\log n \in O(n)$ $\therefore$ $p \geq \log_2 n!$

return $L[2], L[1], L[4], L[3]$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

b c

$L[1] > L[2]$

si: $T_{A,n}$

NO: return $L[2], L[1], L[4], L[3]$

$f(n) \in O(n)$

$c \quad n_0 \quad \forall n \geq n_0$

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$2^n \leq n! \leq n^n$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

$2n \in O(n)$

$\log n \in O(n)$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

$2^p \geq n!$

$p \geq \log_2 n!$

L[1] < L[2] < L[3]

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

L[1] > L[2]

si

NO

$2^n \leq n! \leq n^n$

$$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$$

$\left(\frac{n}{2}\right)^{\frac{n}{2}} \leq n!$

bi

$T_{A,n}$

$2^p \geq n!$

$f(n) \in O(n)$

$2n \in O(n)$.

$\log n \in O(n)$ $\therefore$ $p \geq \log_2 n!$

return L[2], L[1], L[4], L[3]

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si ...

b i

$T_{A,n}$

$f(n) \in O(n)$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$\log n! \in \Theta(n \log n)$

$$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

si

...

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

bi

n

$T_{A,n}$

$f(n) \in o(n)$

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si

$\ldots$

bi

$T_{A,n}$

$f(n) \in o(n)$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$\log n! \in \Theta(n \log n)$

$$\boxed{p \geq \lceil \log_2(n+1) \rceil}$$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

bi

$f(n) \in o(n)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] > L[2]$

si

...

$T_{A,n}$

2^n

$\log n! \in \Theta(n \log n)$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

si

...

bi

2^n

$T_{A,n}$

$f(n) \in o(n)$

c $\quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

si

...

bi

2^n

$T_{A,n}$

n^2

$f(n) \in O(n)$

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1] > L[2]$

si

...

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

bi

2^n

$T_{A,n}$

$\log \left(2^{n^2} \right) \rightarrow n^2$

$f(n) \in o(n)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si

...

bi

$T_{A,n}$

$f(n) \in o(n)$

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

$\log n! \in \Theta(n \log n)$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

2^n

$\log 2^{n^2} \to n^2$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1] > L[2]$

si

$| \ldots$

bi

$T_{A,n}$

$f(n) \in o(n)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$\log n! \in \Theta(n \log n)$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

2^n

$\log 2^{n^2} \to n^2$

$n = 2$

$(1,1) \quad (1,2) \quad (2,1) \quad (2,2)$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1]$

n

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

si

b_i

$T_{A,n}$

n^2

$\log$

$\to n^2$

$f(n) \in O(n)$

$n = 2$

$(1,1)$ $(1,2)$ $(2,1)$ $(2,2)$

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

L[1] < L[2] < L[3]

$\log n! \in \Theta(n \cdot \log n)$

$2n \in O(n)$

L[1]

$\binom{n}{2} + \binom{n}{1}$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

si

bi

$\frac{n(n-1)}{2} + n$

$T_{A,n}$

2

$\log 2^{n^2} \to n^2$

$f(n) \in O(n)$

$n = 2$

(1,1) (1,2) (2,1) (2,2)

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \cdot \log n)$

$2n \in O(n)$

$L[1]$

si

$\binom{n}{2} + \binom{n}{1}$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

bi

$T_{A,n}$

2

$\frac{n(n-1)}{2} + n$

$\log$

$2^{n^2} \to n^2$

$f(n) \in o(n)$

$n = ?$

$(1,1)$ $(1,2)$ $(2,1)$ $(2,2)$

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1]$

si

$\binom{n}{2} + \binom{n}{1}$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

bi

$\frac{n(n-1)}{2} + n$

$T_{A,n}$

2

$\log$

$2^{n^2} \rightarrow n^2$

$f(n) \in o(n)$

$n = 2$

$(1,1)$ $(1,2)$ $(2,1)$ $(2,2)$

c n_0 $\forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1]$

si

b_i

$T_{A,n}$

$f(n) \in O(n)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$\binom{n}{2} + \binom{n}{1}$

$\frac{n(n-1)}{2} + n$

2

$\log n! \in \Theta(n \cdot \log n)$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

$\log 2^{n^2} \to n^2$

$n = 2$

$(1,1) \quad (1,2) \quad (2,1) \quad (2,2)$

$L[1] < L[2] < L[3]$

$\log n! \in \Theta(n \log n)$

$2n \in O(n)$

$L[1]$

$\binom{n}{2} + \binom{n}{1}$

$\boxed{p \geq \lceil \log_2 (n+1) \rceil}$

si

bi

$\frac{n(n-1)}{2} + n$

$T_{A,n}$

2

$\log 2^{n^2} \to n^2$

$f(n) \in o(n)$

$n = 2$

$(1,1) \quad (1,2) \quad (2,1) \quad (2,2)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$

$L[1] < L[2] < L[3]$

$2n \in O(n)$

$L[1]$

si

$\log n! \in \Theta(n \log n)$

$\binom{n}{2} + \binom{n}{1}$

$\boxed{p \geq \lceil \log_2(n+1) \rceil}$

bi

$T_{A,n}$

$2 \quad \frac{n(n-1)}{2} + n$

$\log \quad 2^{n^2} \longrightarrow n^2$

$f(n) \in o(n)$

$n = 2$

$(1,1) \quad (1,2) \quad (2,1) \quad (2,2)$

$c \quad n_0 \quad \forall n \geq n_0$

$f(n) \leq c \cdot n$