Lecture 3, Fall 2023

$$f(n) = f(n-1) + f(n-2)$$

```
Fib(n)
 if n==1    return 1
 else       return Fib(n-1) + Fib(n-2)
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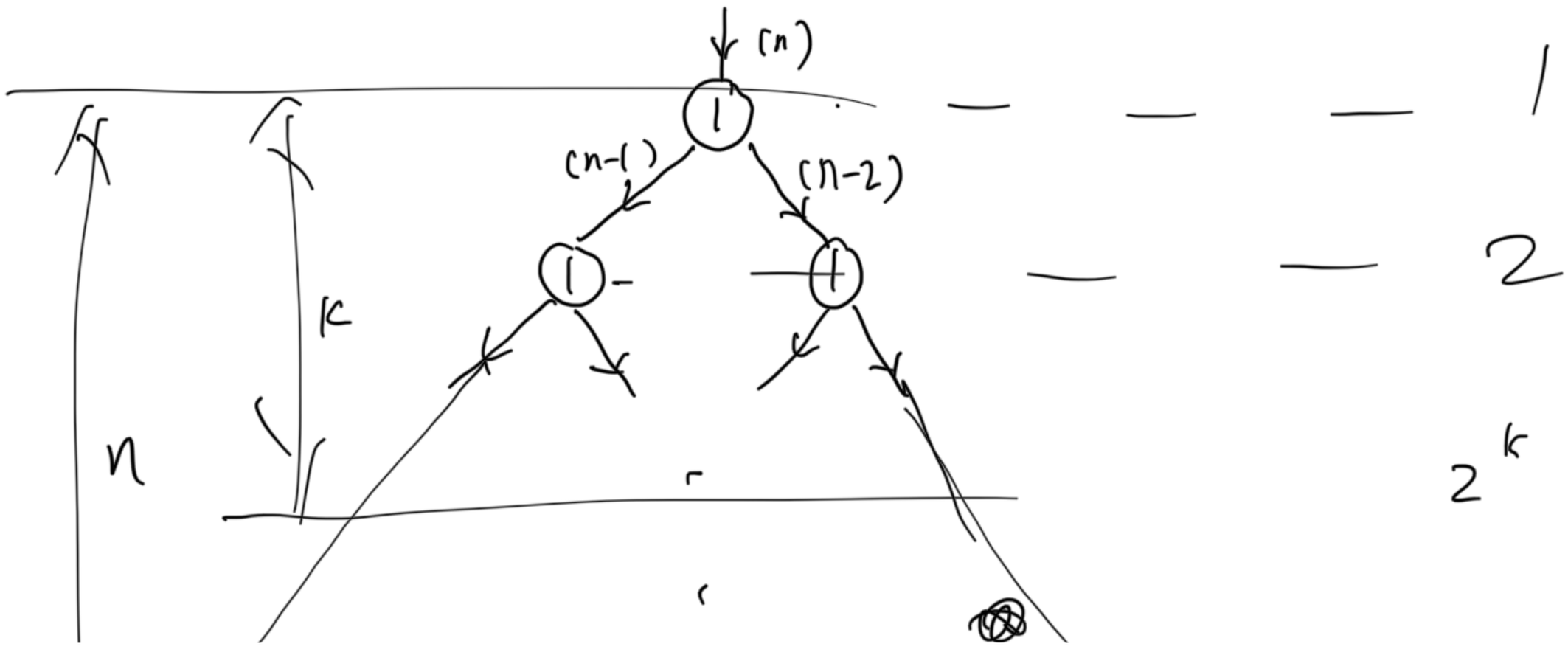
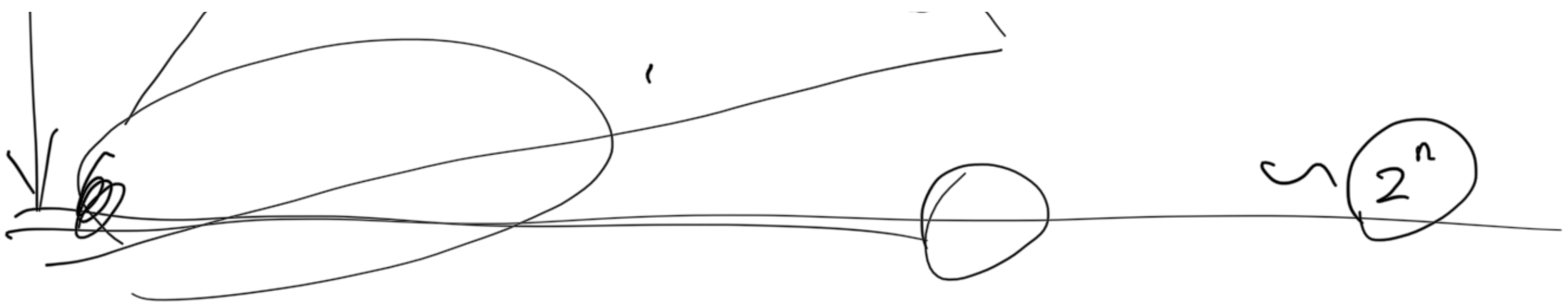
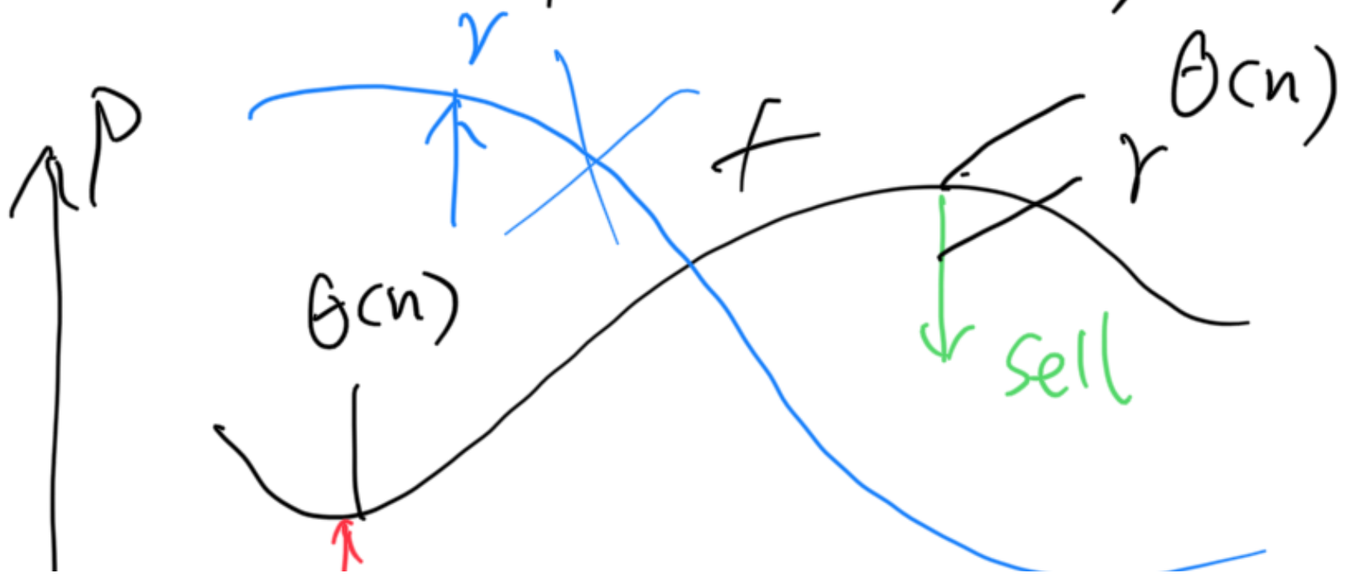
$$T(n) = T(n-1) + T(n-2) + \theta(1)$$





A[i]: Stock price change in day i,

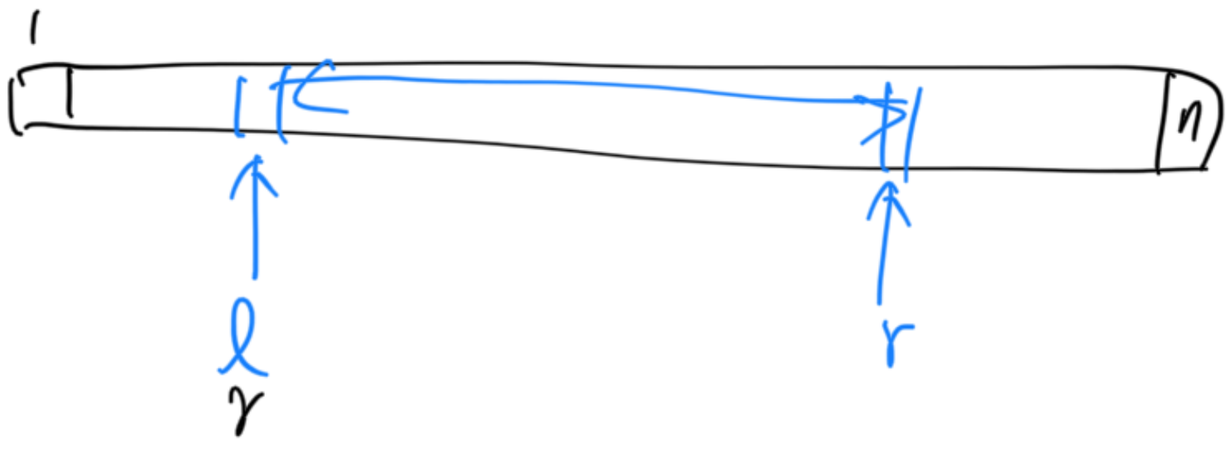
P[i]: stock price at day i



$= \Theta(n)$

$$P[i] = P[0] + \sum_{j=1}^{i} A[i]$$

$$\max_{l,r} \sum_{i=l}^{r} A[i]$$

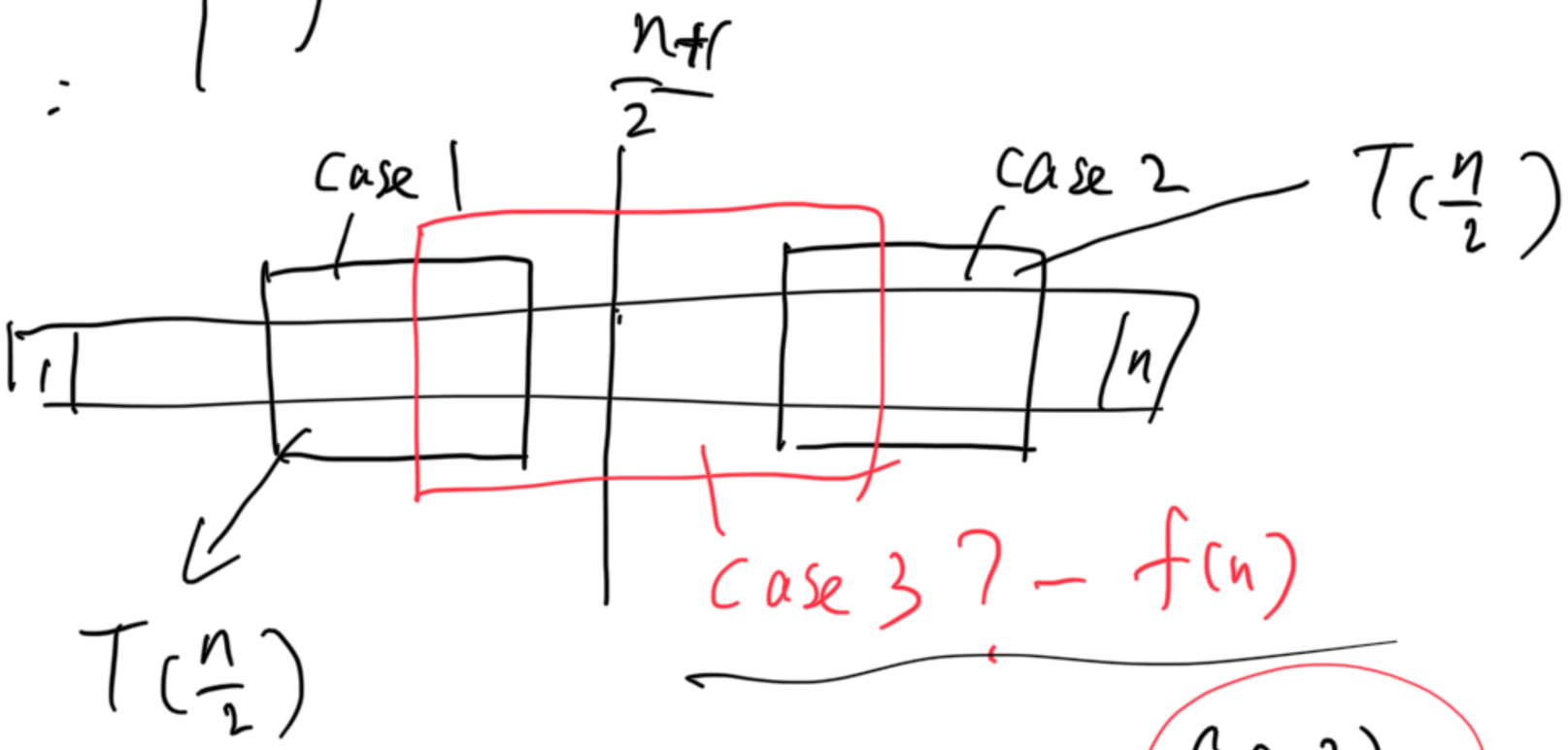


$l=1$: n

$l=2$: $n-1$

$\frac{n(n+1)}{2} \longrightarrow \Theta(n^2)$

$l = n : 1$



$T(n) = 2T(\frac{n}{2}) + f(n)$ $<$ $\theta(n^2)$

$\theta(n)$

$a = b = 2$

$n^{\log_2 2} = n$

$\theta(n \log n)$ ✓

$f(n) = n^2$ $\quad n^2$ ✗

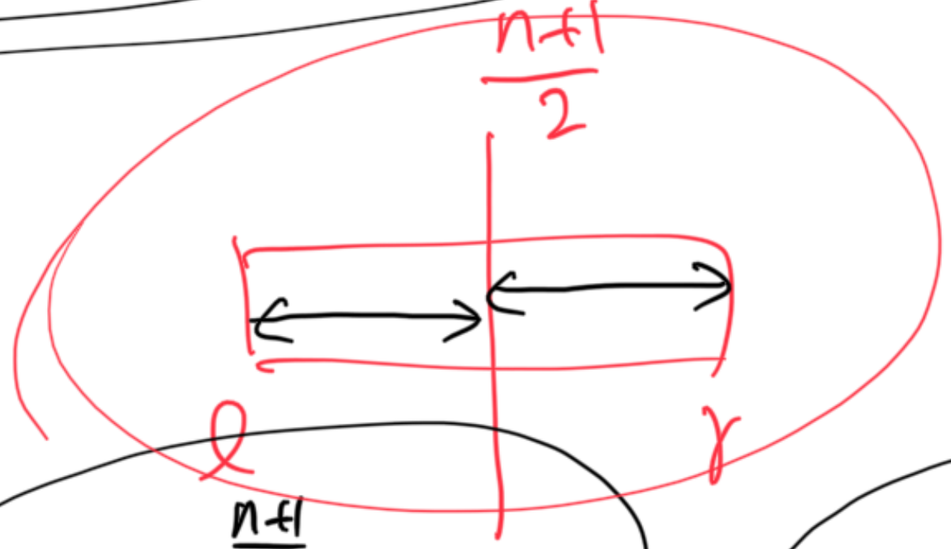
$f(n) = n$, $\quad n \log n$ ✓

$f(n) = \Theta(n)$ $\quad n$ ✓

$T(n) = O(n)$

$$\max_{1 \le l \le \frac{n+1}{2} \le r \le n} \sum_{i=l}^{r} A[i]$$

$C(l, r)$ $\frac{(n+1)^2}{4}$

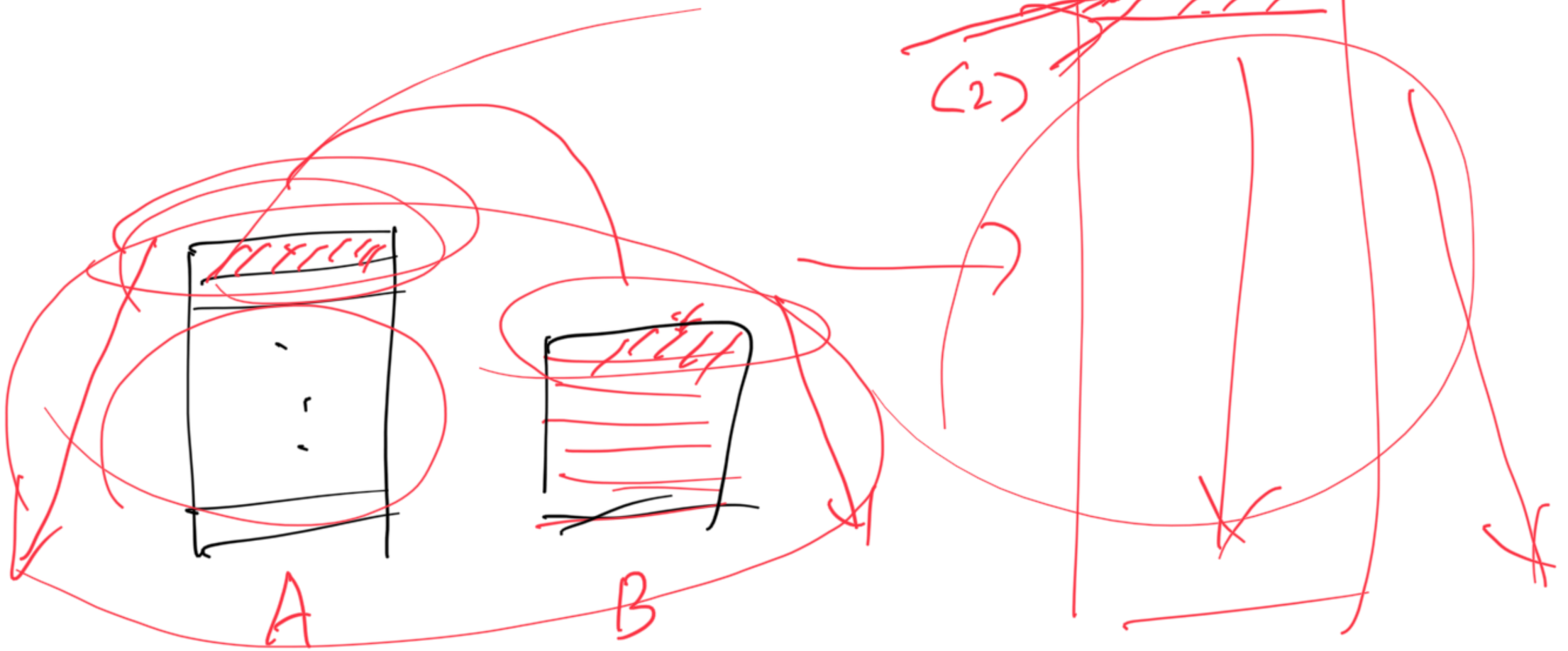


$$= \max_{1 \le l \le \frac{n+1}{2}} \sum_{i=l}^{\frac{n+1}{2}} A[i] + \max_{r \ge \frac{n+1}{2}} \sum_{i=\frac{n+1}{2}+1}^{r} A[i]$$

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

$\Theta(n)$

<1>


A
B
(2)