

Q

for i in $\text{stangl}(n) \rightarrow n$

for j in $\text{orangl}(n) \leftarrow nxn$

$n +$
 n^2
 $+ n^2 + n^2 \cancel{+ n^2} \rightarrow$
 $+ n^2 + n^2 \cancel{+ n^2} \rightarrow O(n^2)$

if $a == 0 \rightarrow nxnx$

else: $\begin{array}{l} \text{stmt} \rightarrow nxnx \\ \cancel{nxnx} \\ \text{stmt} \rightarrow nxnx \end{array}$

③

$$\underline{i = 0} \rightarrow 1$$

for i in range(10) $\rightarrow n+1$

$$8tn^n + \rightarrow n+1$$

$$1+n+1+n+1$$

$$\cancel{2n+3} \rightarrow \underline{\underline{o(n)}}$$

④

for i in $\text{range}(1, n)$; $\rightarrow h$

$i = i / 2$ $\rightarrow n \times 1$

$n + n$

$\rightarrow 2n \rightarrow O(n)$

5

for i in $\text{range}(n/2)$; $\leftarrow n/2 + 1$

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

$\rightarrow O(n) \xrightarrow{\text{Stm}} n + n/2$

$\sqrt{2^n/2}$

6

Tracing

for (i = 1, i < n ; i = i * 2) {

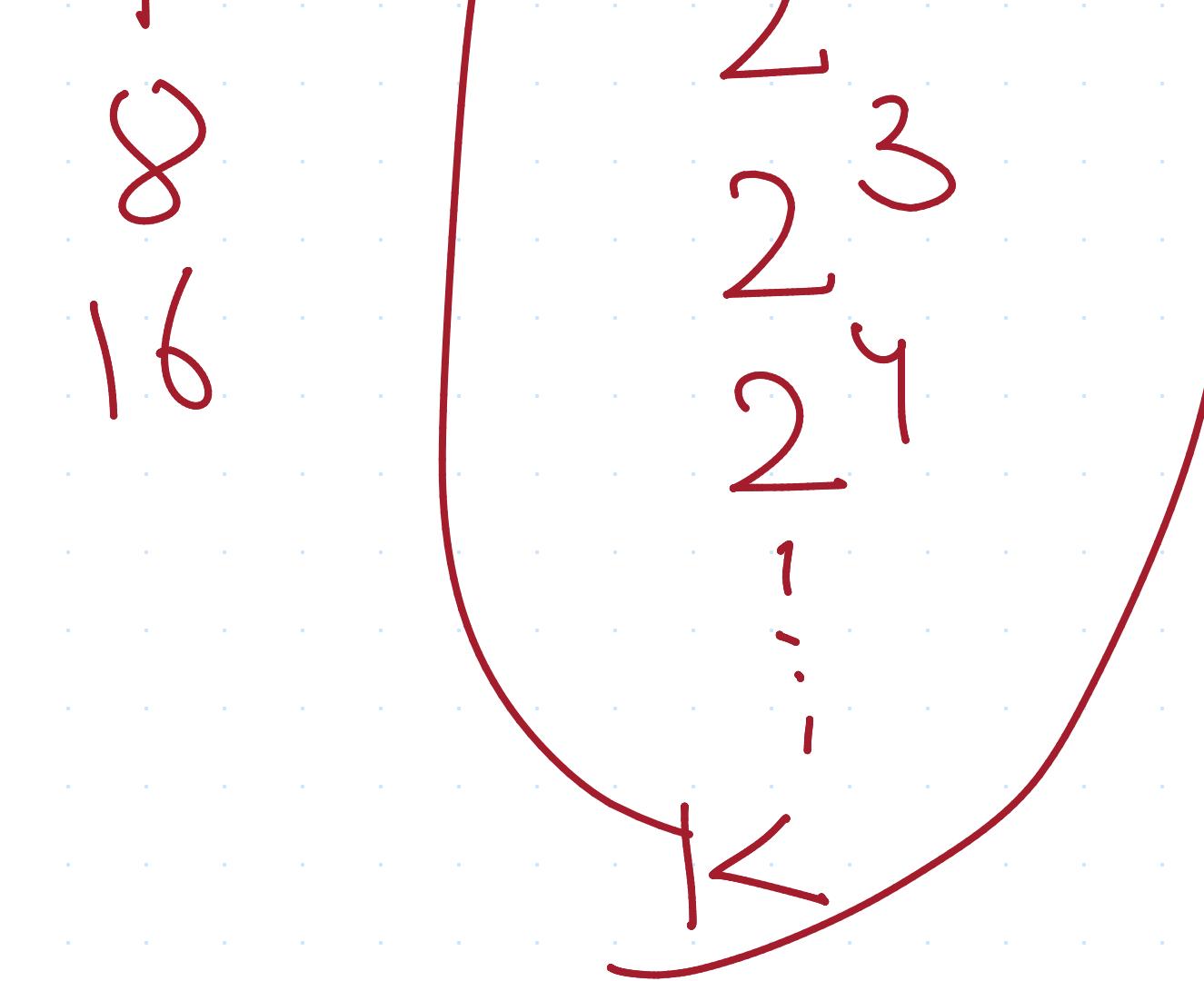
2
2 2 2 2
2 3
2 4

$-2^k \leq \log_2(n)$

stmtⁿ

i
1
2
3
4
5
6
7
8

~~$O(n)$~~ $O(n)$ $O(n)$
 $O(n)$ $O(\log(n))$



$$1 + 2 + 2^2 + 2^3 + 2^4 + \dots + 2^K$$

$$2^K > n \quad 2^K = n$$

$$2^K = n \rightarrow \log_2(n)$$

$$\log(2)^K = \log(n) \Rightarrow \underline{\underline{O(\log(n))}}$$

$$K_0 \log(2) = \log(n)$$
$$12 = \underline{\underline{\log(n)}}$$

$O(1) \rightarrow$ Best

10

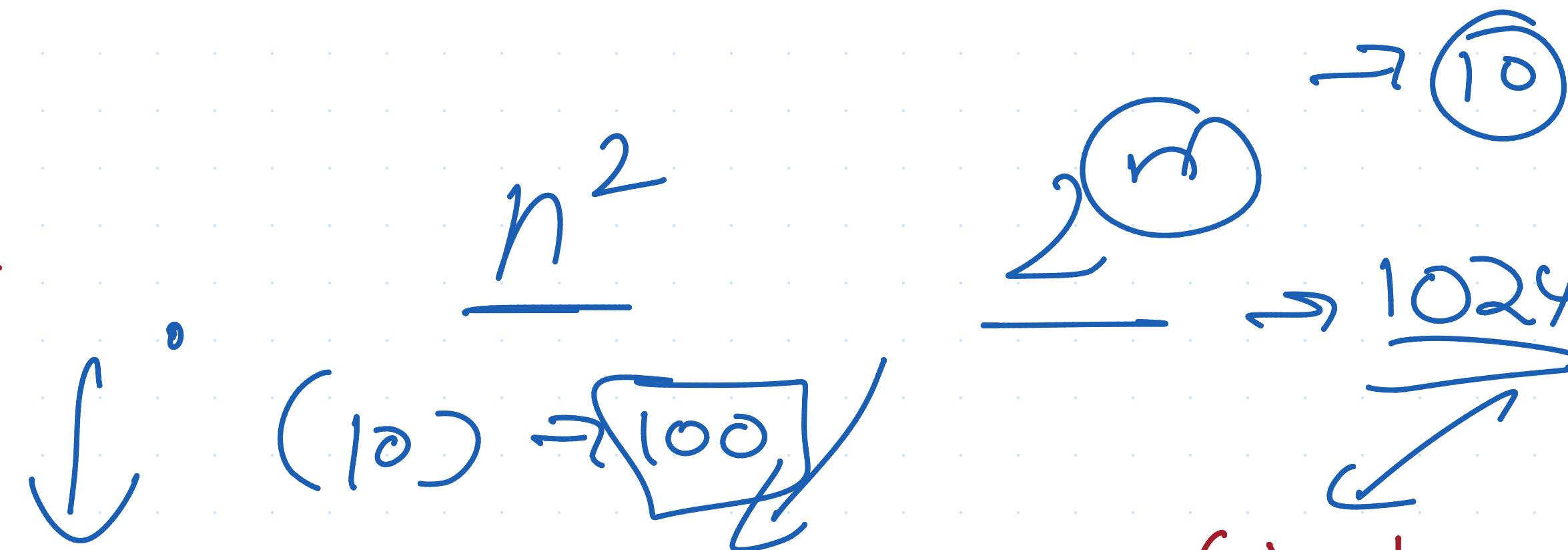
$\underline{\underline{O(1)}} > \underline{\underline{O(n)}}$

$$\underline{O(n)} \rightarrow \underline{10}$$

$$\underline{O(2^n)} \rightarrow \underline{1024}$$

Preferen \circ

$$\begin{array}{c} \boxed{O(1)} > O(\log n) > O(n) > O(n \log n) \\ O(n^2) > O(n^3) \dots O(n^n) > O(2^n) \end{array}$$



$$n^3 > 2^n$$

$$1000 \approx 1024$$

$$\boxed{n=10}$$

$$\frac{100}{2} < n$$

Worst

$$1, 2, 2^2, 2^3, 2^4, \dots = 2^K$$

$$\boxed{2^n} \rightarrow \underline{\log(n)}$$

5

for ($i = 1, i \leq n, i \neq 2$) {
 $\Sigma = 1$
 $\Sigma = \Sigma + 2^i$
}

$Stm^n +$

3

1, 2, 3, ..., K

$$\frac{K(K+1)}{2} \geq n$$

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

$$\frac{k^2}{2} + \frac{k}{2} = n$$

$$k^2 = n$$

$$\log(k^2) = \log(n)$$

~~$2\log(k) = \log(n)$~~

$\rightarrow \log(n)$

6

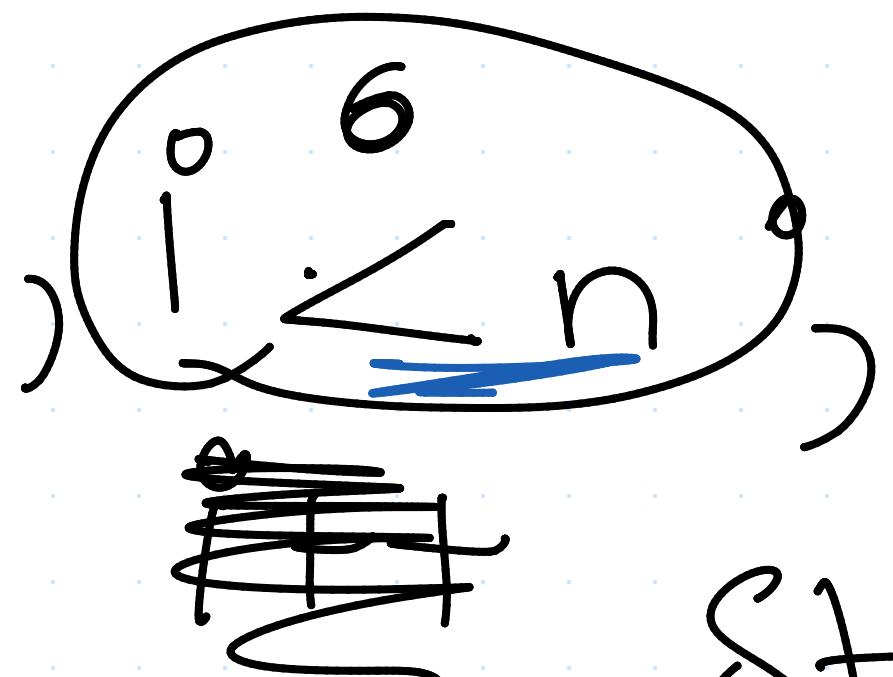
for (i = 1, i < n, i++) {

Stmⁿ⁺³

$O(n)$

(*)

For ($i = 1$,



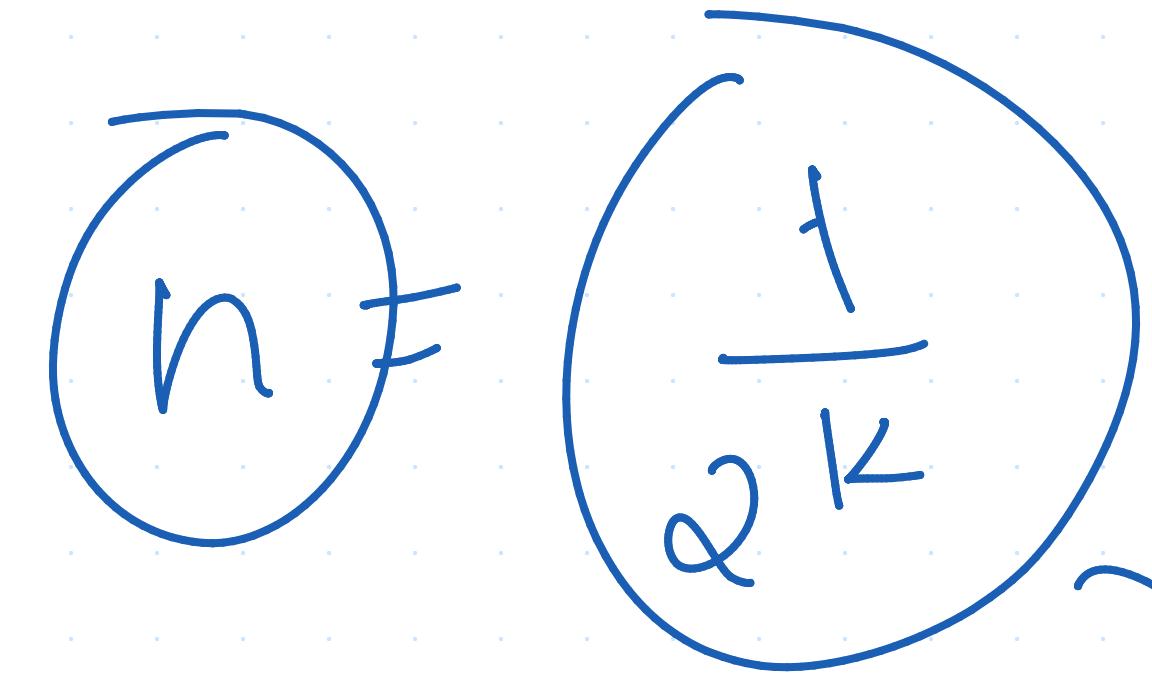
$i = i/2$) \in

$Stm^n + 3$

i
1
 $1/2$
 $1/4$
 $1/8$
 $1/16$
 \dots
 $1/2^k$

y16 - -

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



$$\log\left(\frac{1}{2^K}\right) = K$$

$$\log(n) = \log\left(\frac{1}{2^K}\right)$$

$$\log(n) = \log(1) + \log\left(1 + 2^K\right)$$

$$K = \log n$$

$$n \leq 10$$

$$K = \log(n)$$

$$\log(n) = \log 1 + \log(2^K)$$

$$\underline{\underline{\log(n)}} \rightarrow O(\underline{\underline{\log_2(n)}})$$