Sheet (2)

Q ① %

① O(n)   ④ O(n²)

② O(n²)   ⑤ O(n⁵)

③ O(n³)

Q ② :

ⓐ linear
$$T(n) = C * N$$
$$0.5ms = C * 100$$
$$C = \frac{0.5 * 10^{-3}}{100}$$

$$T(n) = C * N$$
$$60 = \frac{0.5 * 10^{-3}}{100} * N$$

$$\boxed{N = 12 * 10^6}$$

ⓑ O(N log N)
$$T(n) = C * N log N$$
$$0.5 * 10^3 = C * 100 log 100$$
$$C = \frac{0.5 * 10^{-3}}{100 log 100}$$

$$60 = \frac{0.5 * 10^{-3}}{100 log 100} * N log N$$

$$N = 3656807.36 \approx \boxed{3656807}$$
floor تنفذ

مشهفری
الحاسبه تابع
اللوغ
بتعملها
log₂
مصطلح نفس
الإجابة

c) Quadratic

$$T(n) = C * N^2$$

$$C = \frac{0.5 * 10^{-3}}{(100)^2}$$

$$60 = \frac{0.5 * 10^{-3}}{(100)^2} * N^2$$

$$\boxed{N = 34641}$$

d) Cubic

$$T(n) = C * N^3$$

$$C = \frac{0.5 * 10^{-3}}{(100)^3}$$
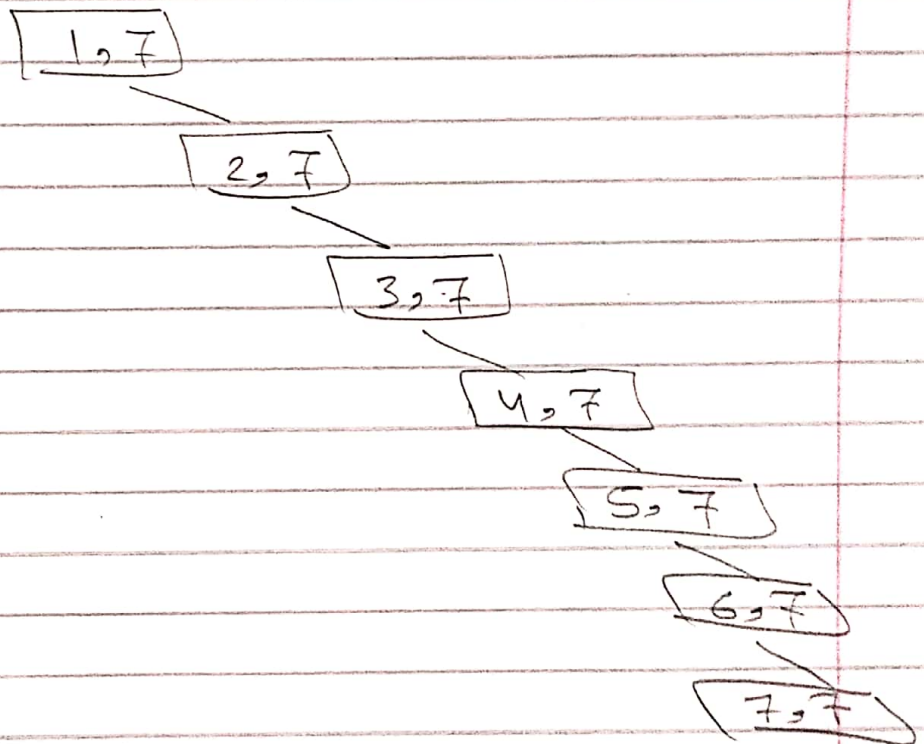
$$60 = \frac{0.5 * 10^{-3}}{(100)^3} * N^3$$

$$\boxed{N = 4932}$$

3 | worst-Case Performance in quicksort

$\llcorner$ $O(n^2)$

1	2	3	4	5	6	7
2	4	8	10	16	17	18

$\llcorner$ sorted array

quick sort will sort it again

| 1, 7 |

| 2, 7 |

| 3, 7 |

| 4, 7 |

| 5, 7 |

| 6, 7 |

| 7, 7 |

To improve worst-case?

select middle   OR   select Random
element   element as a pivot
as a pivot

④ Worst-Case Performance in Merge-Sort

Merge-sort worst & best $\rightarrow$ $o(n \log n)$

There is a trival case when $n = 1$
$\hookrightarrow o(1)$
but we don't $\hookleftarrow$
Consider it as best