

8BB12
D9HXT

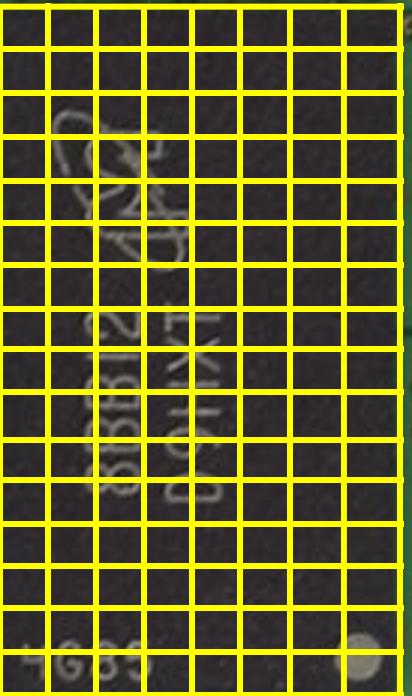
8BB12
D9HXT

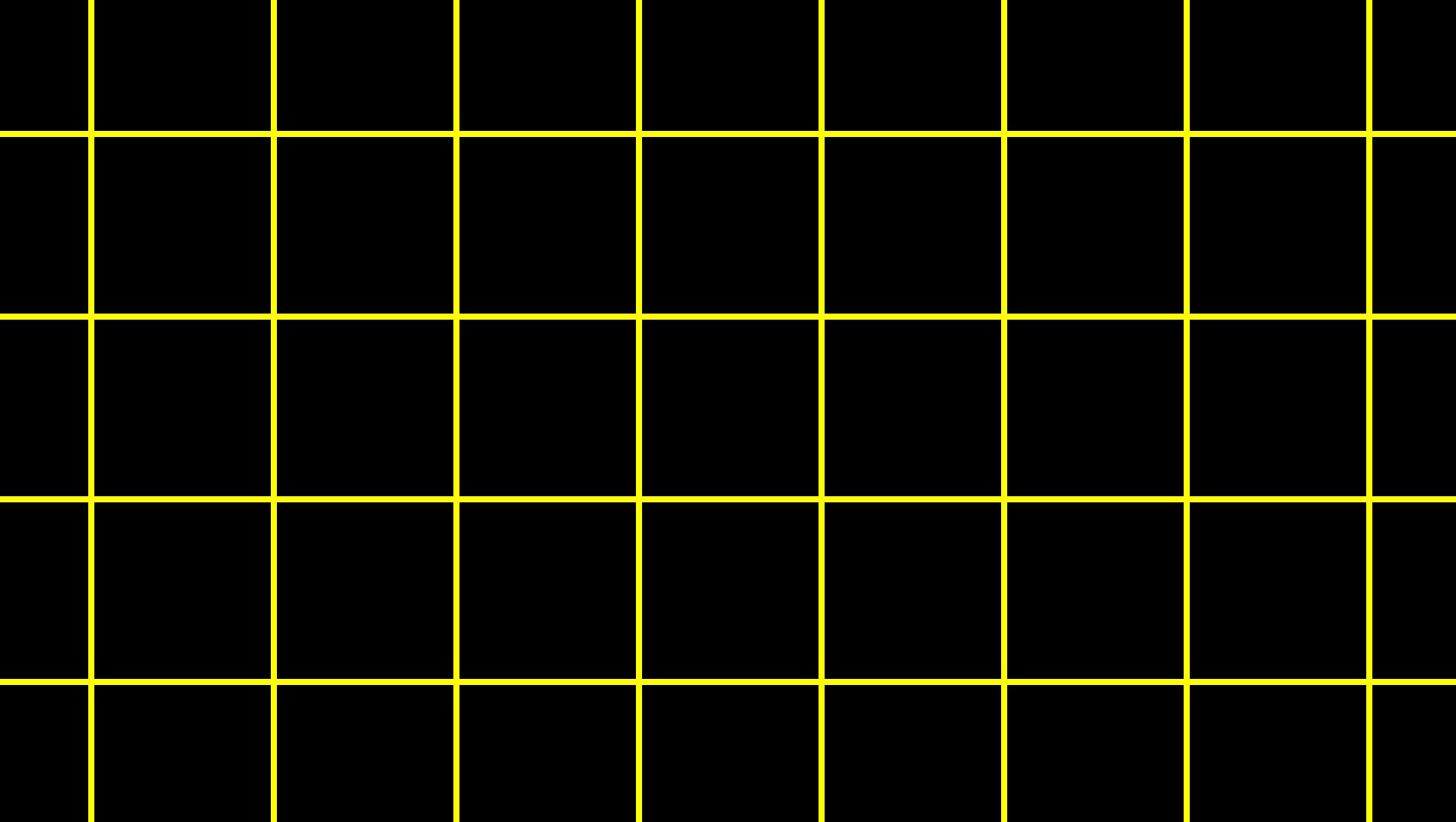
4G85

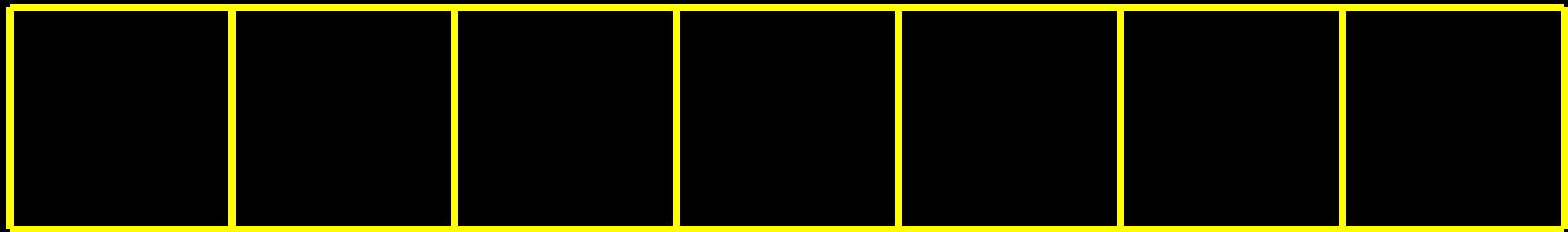
4G85

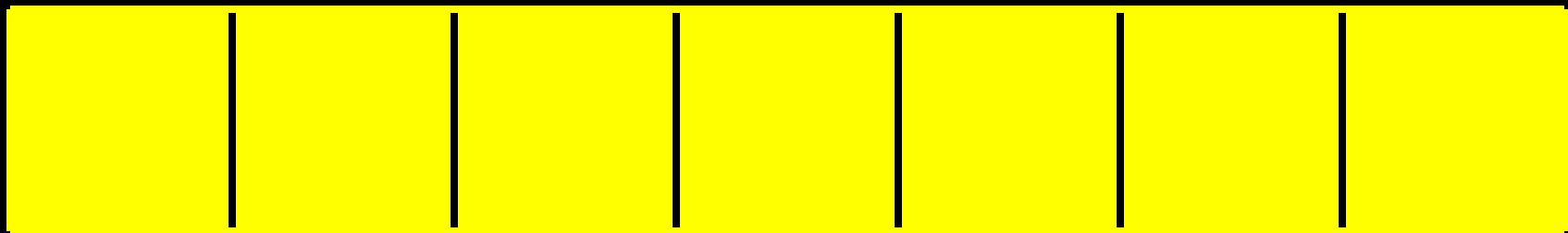
8BB12
D9HXT

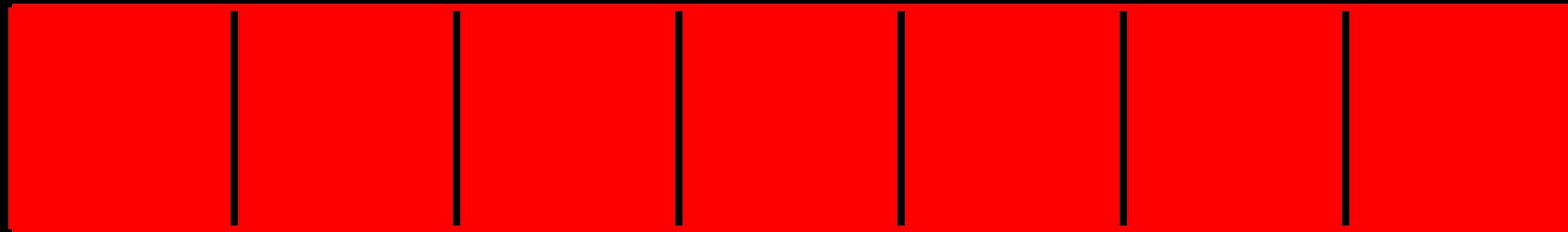
4G85



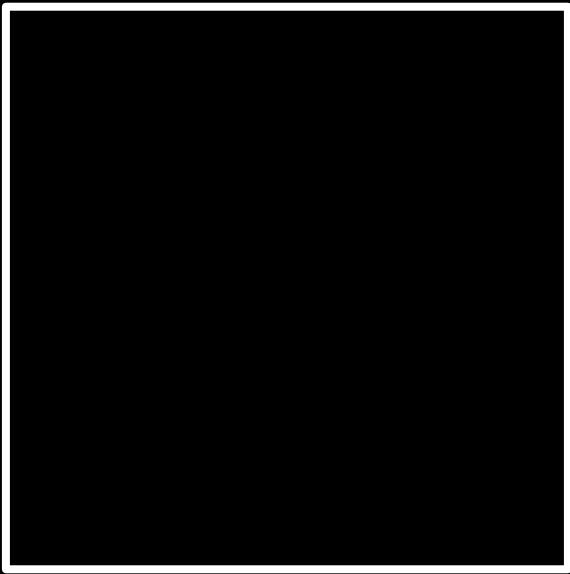




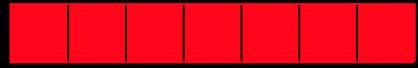




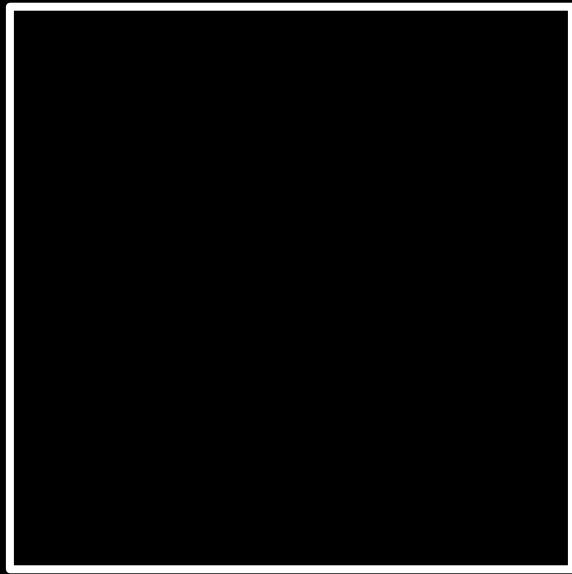
input →



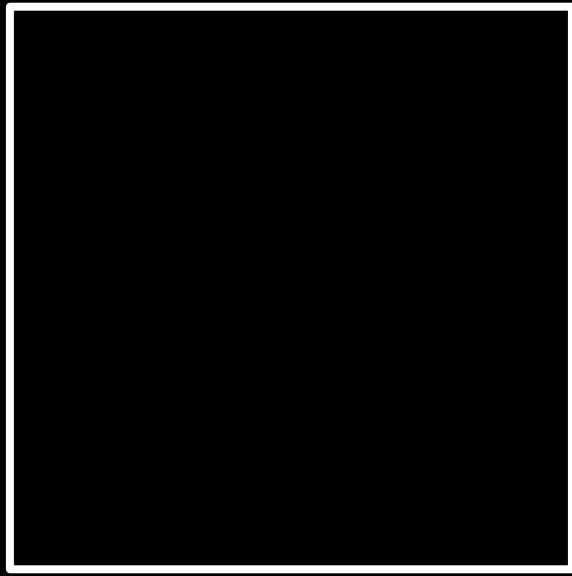
→ output



→



→ output



→ bool

algorithms

linear search

```
For i from 0 to n-1
    If i'th element is 50
        Return true
    Return false
```

binary search

```
If middle item is 50
    Return true
Else if 50 < middle item
    Search left half
Else if 50 > middle item
    Search right half
```

If no items

If middle item is 50

 Return true

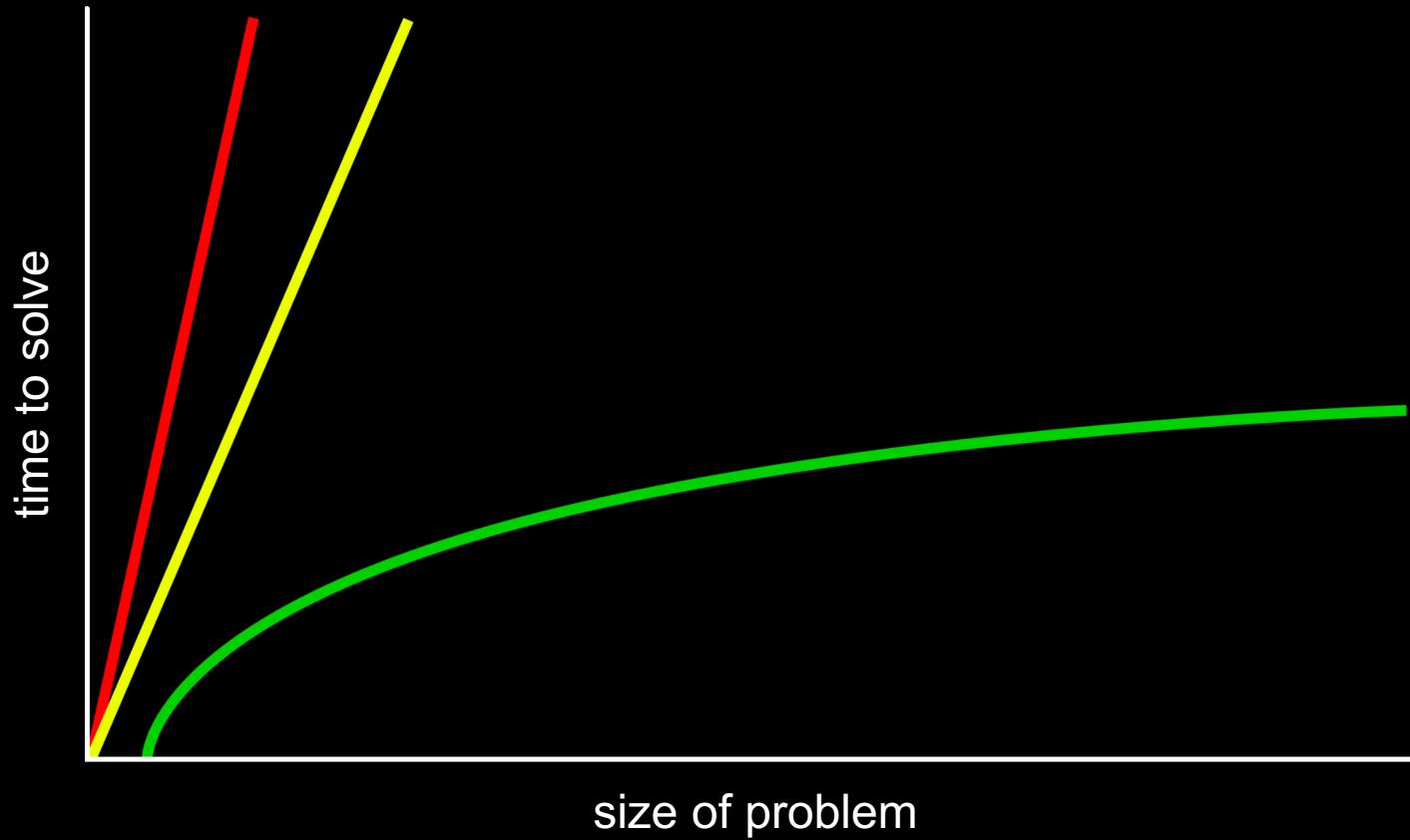
Else if $50 < \text{middle item}$

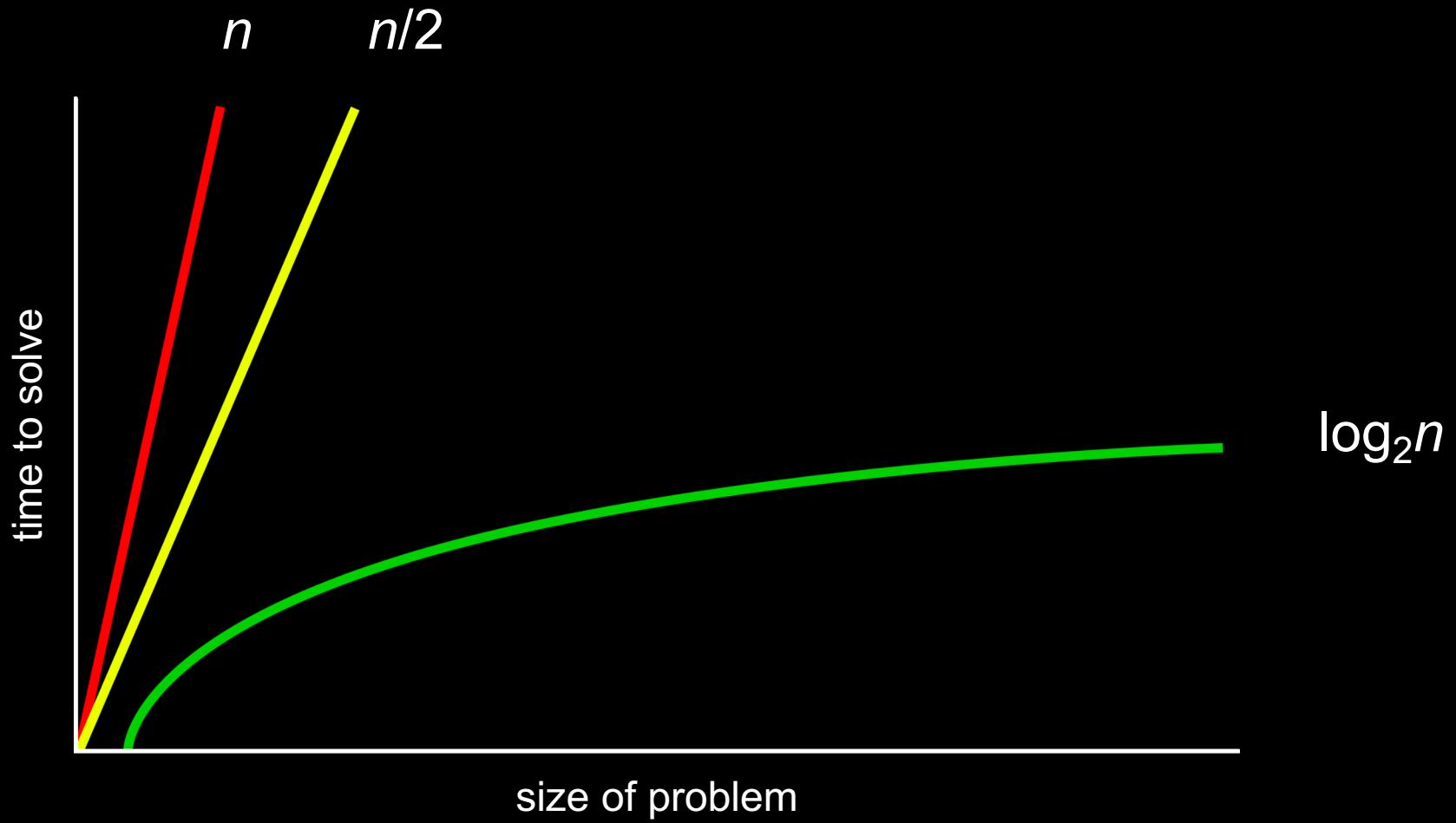
 Search left half

Else if $50 > \text{middle item}$

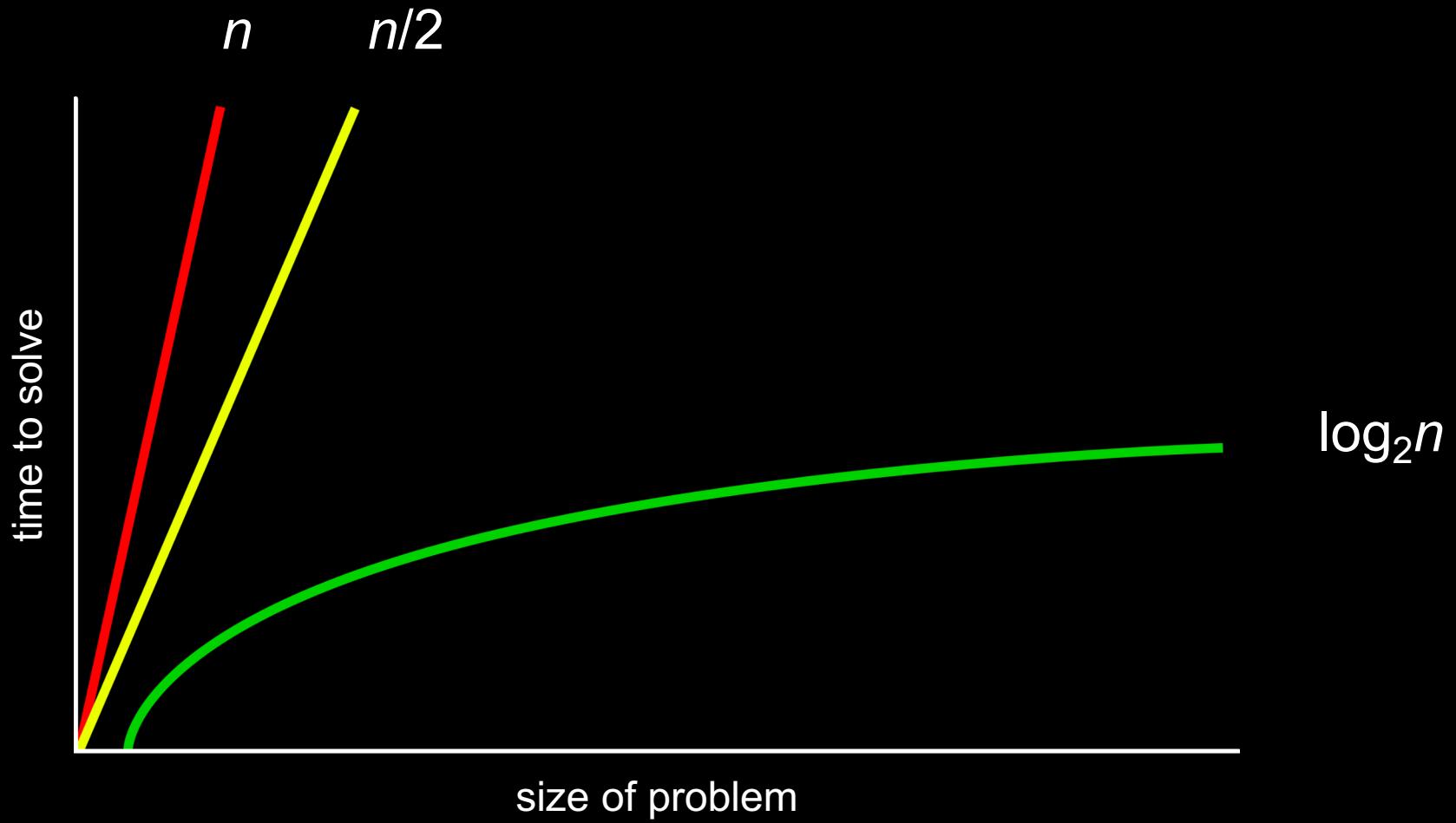
 Search right half

```
If no items
    Return false
If middle item is 50
    Return true
Else if 50 < middle item
    Search left half
Else if 50 > middle item
    Search right half
```

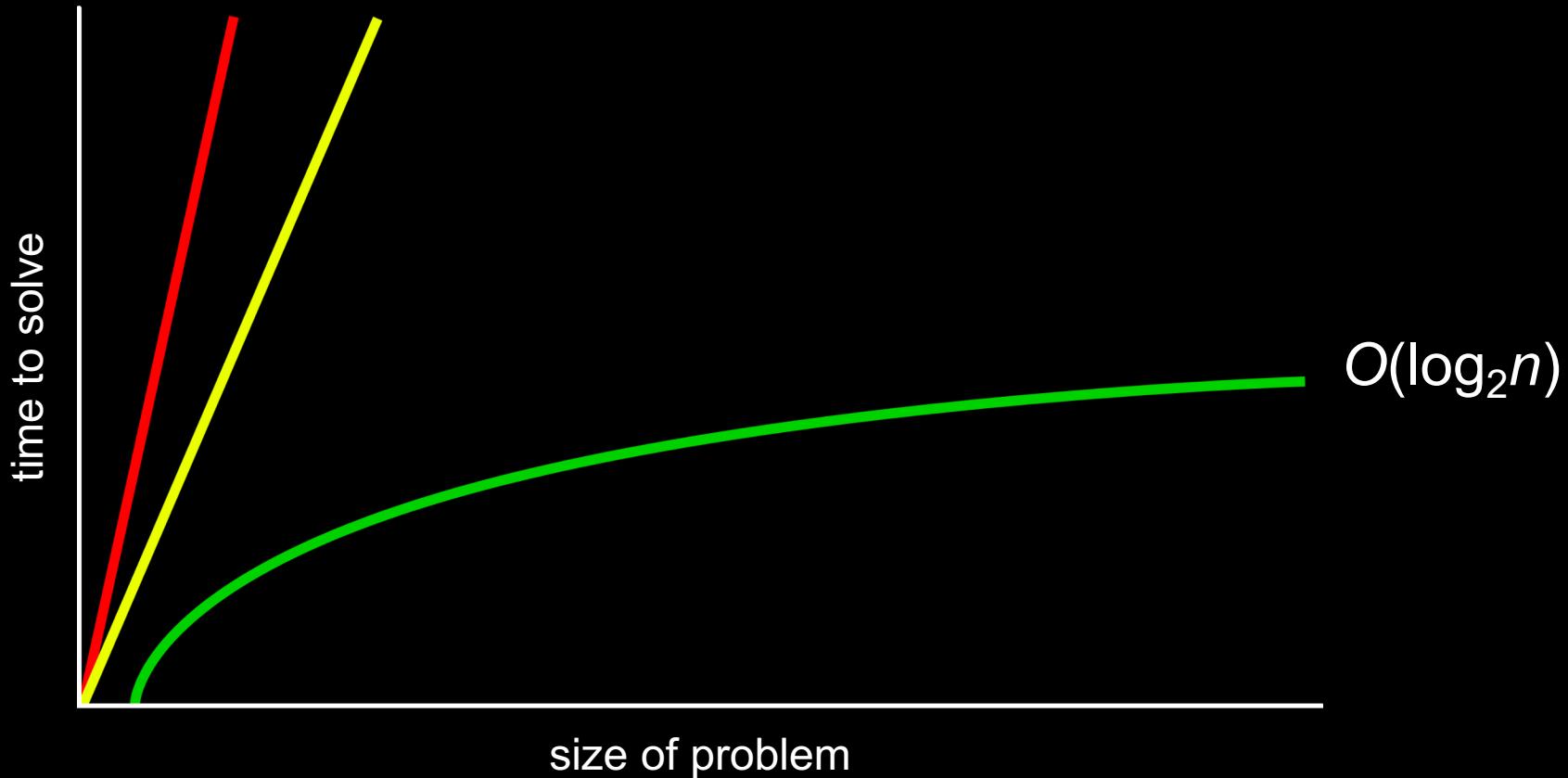


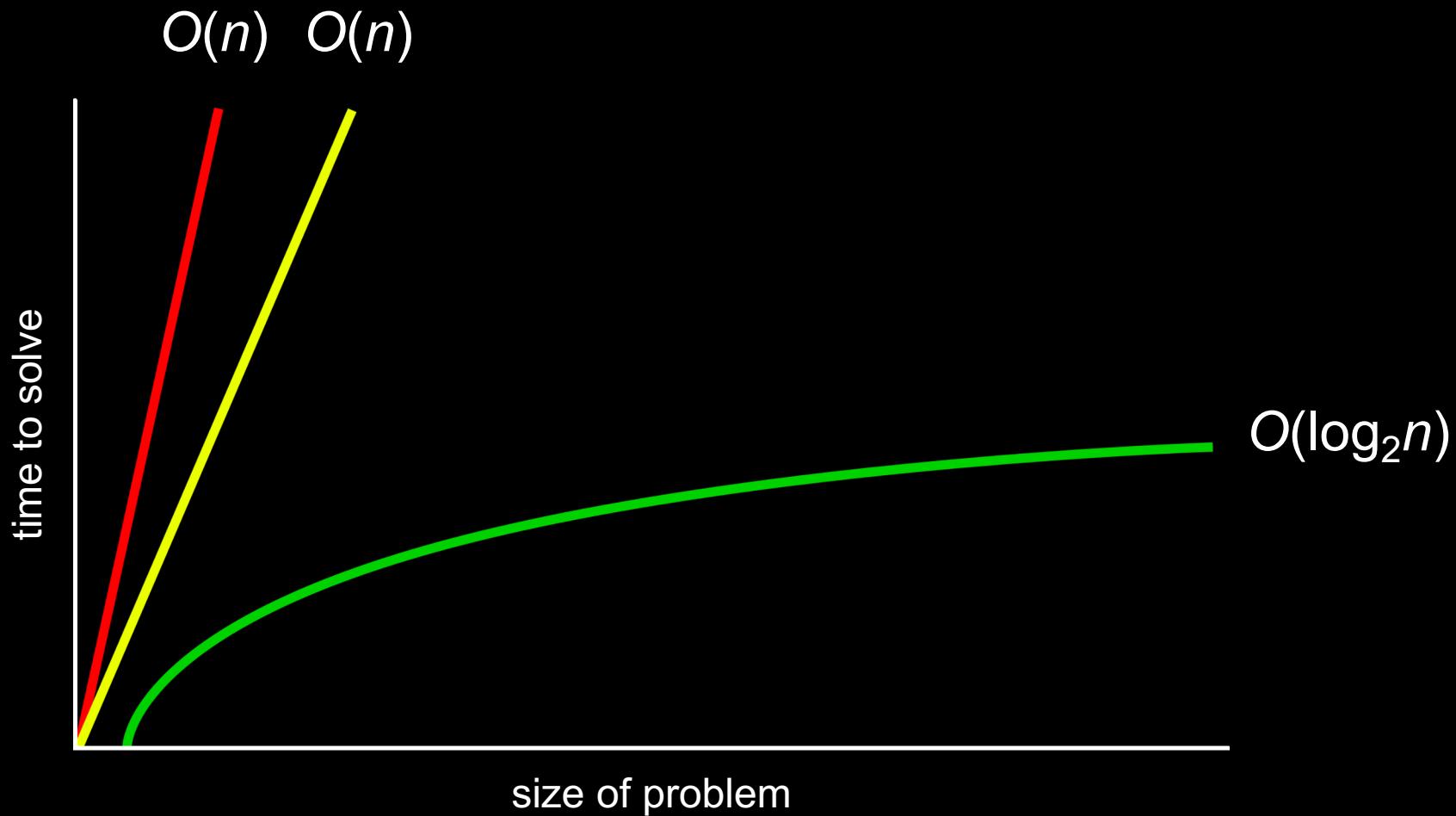


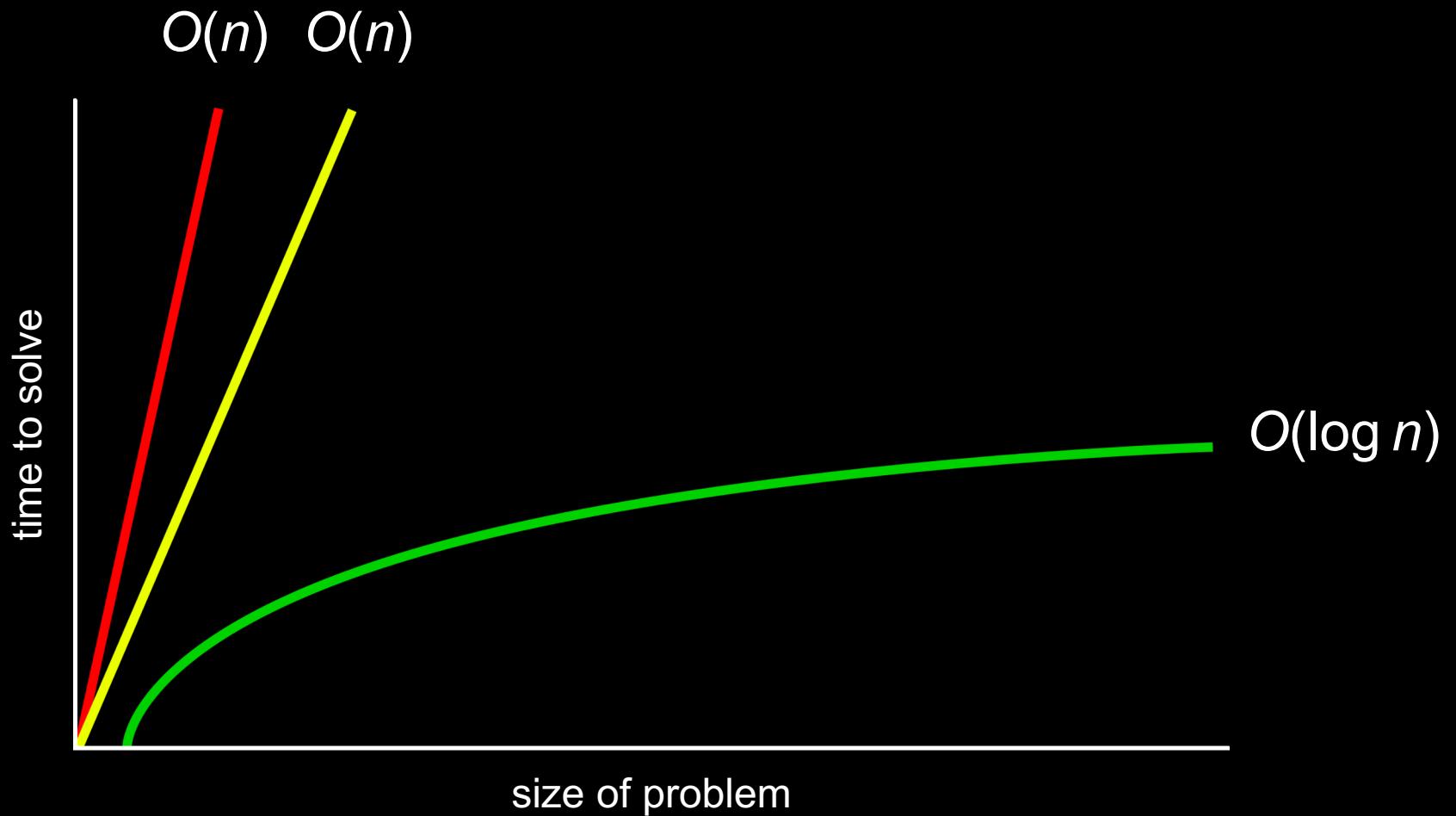
O

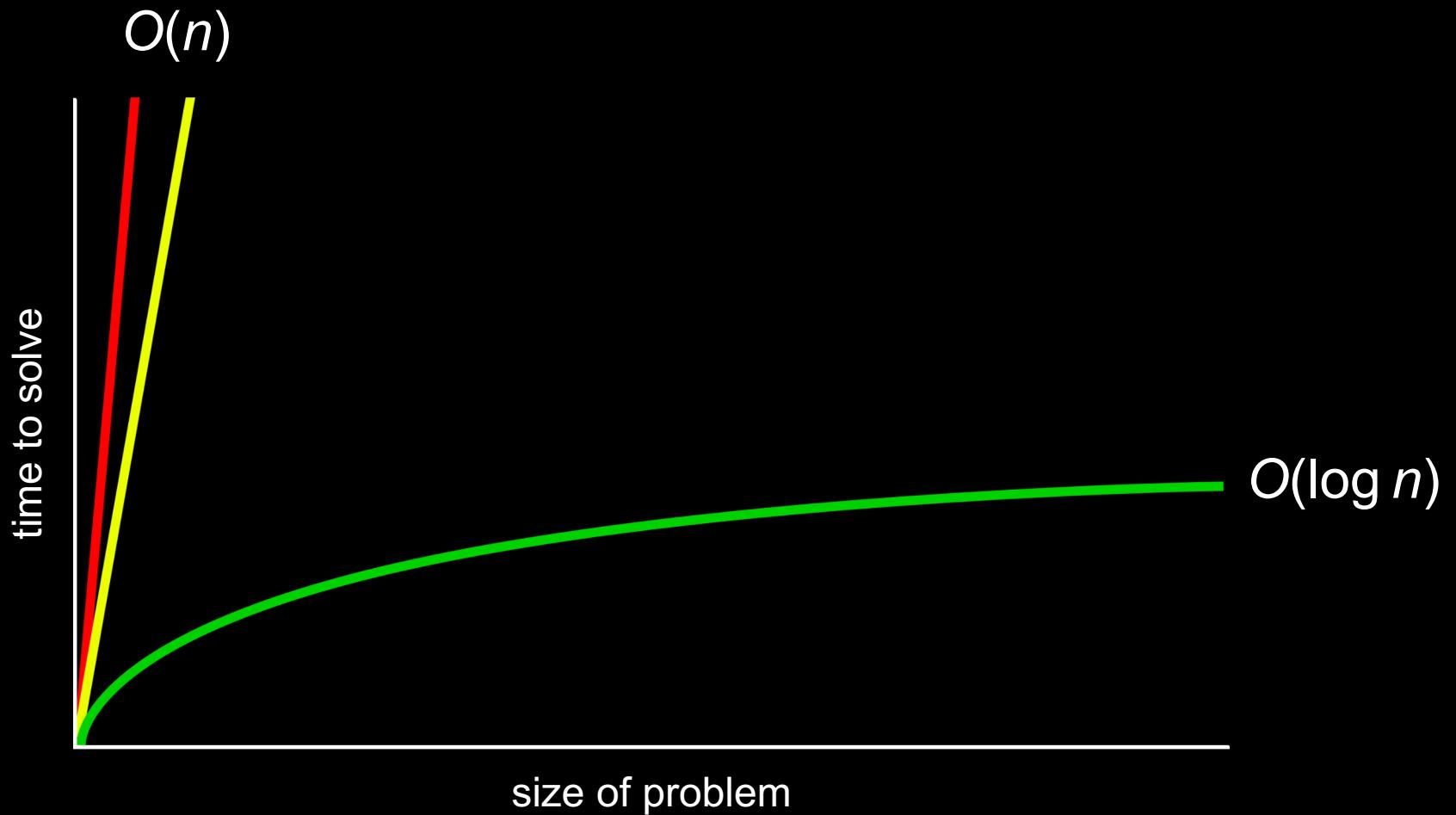


$O(n)$ $O(n/2)$









$O(n^2)$

$O(n \log n)$

$O(n)$

$O(\log n)$

$O(1)$

$O(n^2)$

$O(n \log n)$

$O(n)$ linear search

$O(\log n)$

$O(1)$

$O(n^2)$

$O(n \log n)$

$O(n)$ linear search

$O(\log n)$ binary search

$O(1)$

Ω

$\Omega(n^2)$

$\Omega(n \log n)$

$\Omega(n)$

$\Omega(\log n)$

$\Omega(1)$

$\Omega(n^2)$

$\Omega(n \log n)$

$\Omega(n)$

$\Omega(\log n)$

$\Omega(1)$

linear search

$\Omega(n^2)$

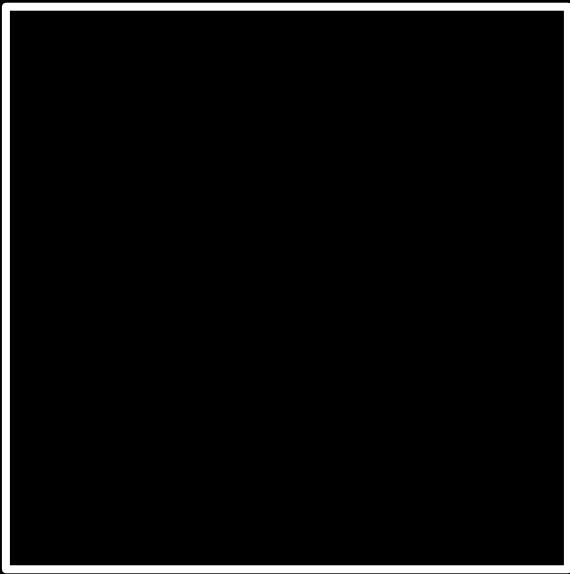
$\Omega(n \log n)$

$\Omega(n)$

$\Omega(\log n)$

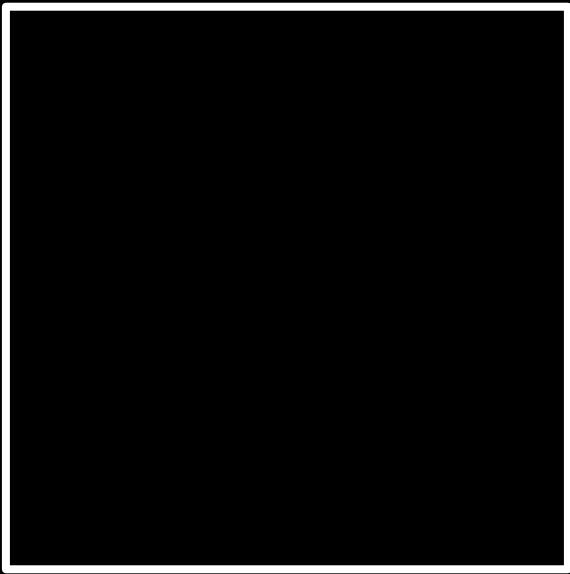
$\Omega(1)$ linear search, binary search

input →



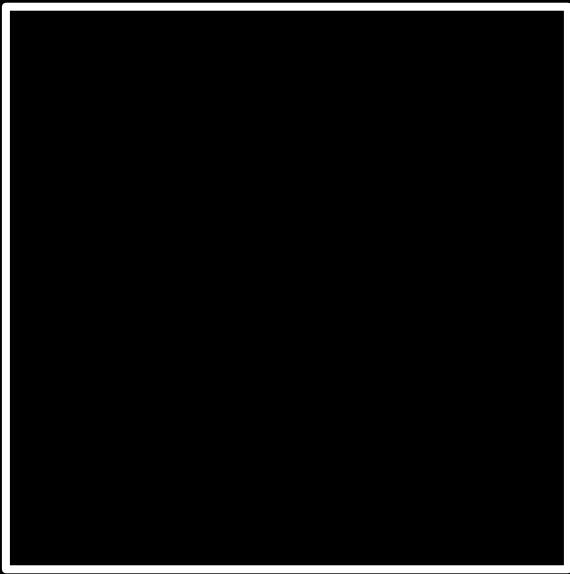
→ output

unsorted →



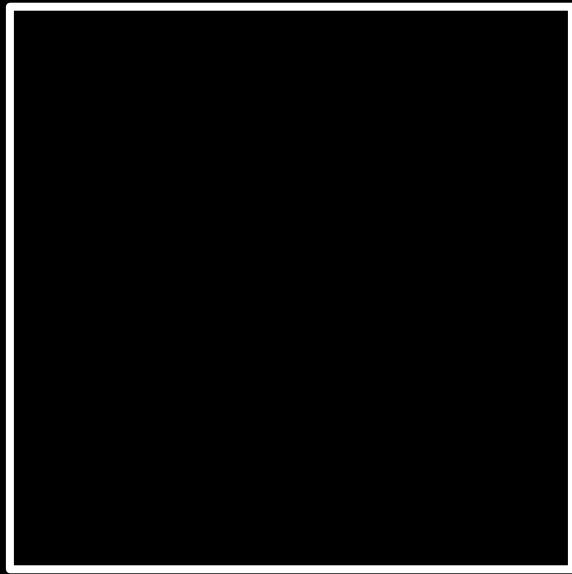
→ output

unsorted →



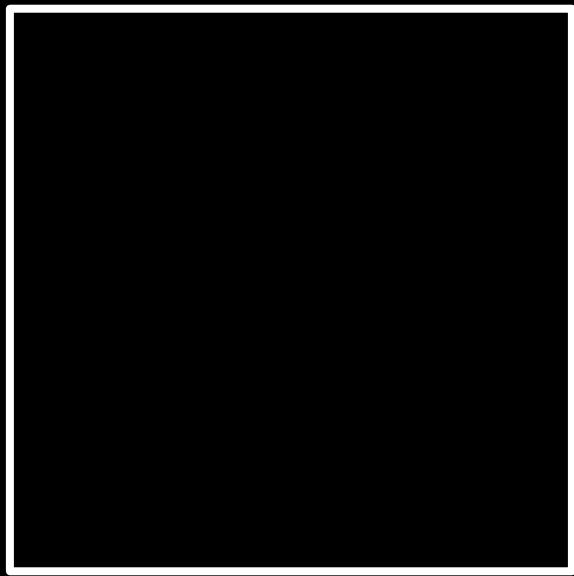
→ sorted

7 2 1 6 3 4 50



→ sorted

7 2 1 6 3 4 50



→ 1 2 3 4 6 7 50

6 3 8 5 2 7 4 1

recursion

- 1 Pick up phone book
- 2 Open to middle of phone book
- 3 Look at page
- 4 If Smith is on page
 - 5 Call Mike
- 6 Else if Smith is earlier in book
 - 7 Open to middle of left half of book
 - 8 Go back to line 3
- 9 Else if Smith is later in book
 - 10 Open to middle of right half of book
 - 11 Go back to line 3
- 12 Else
 - 13 Quit

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