

This is CS50.

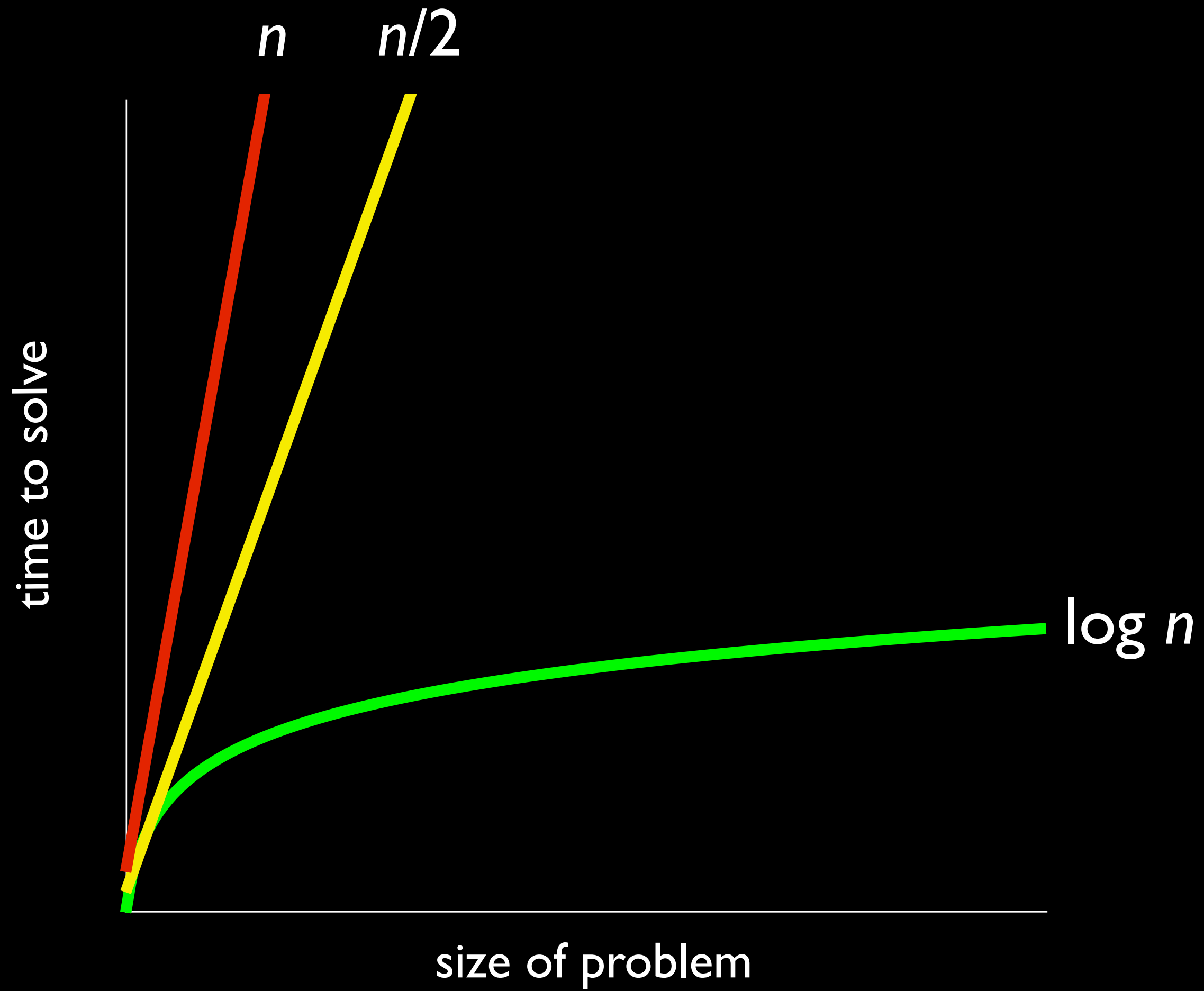


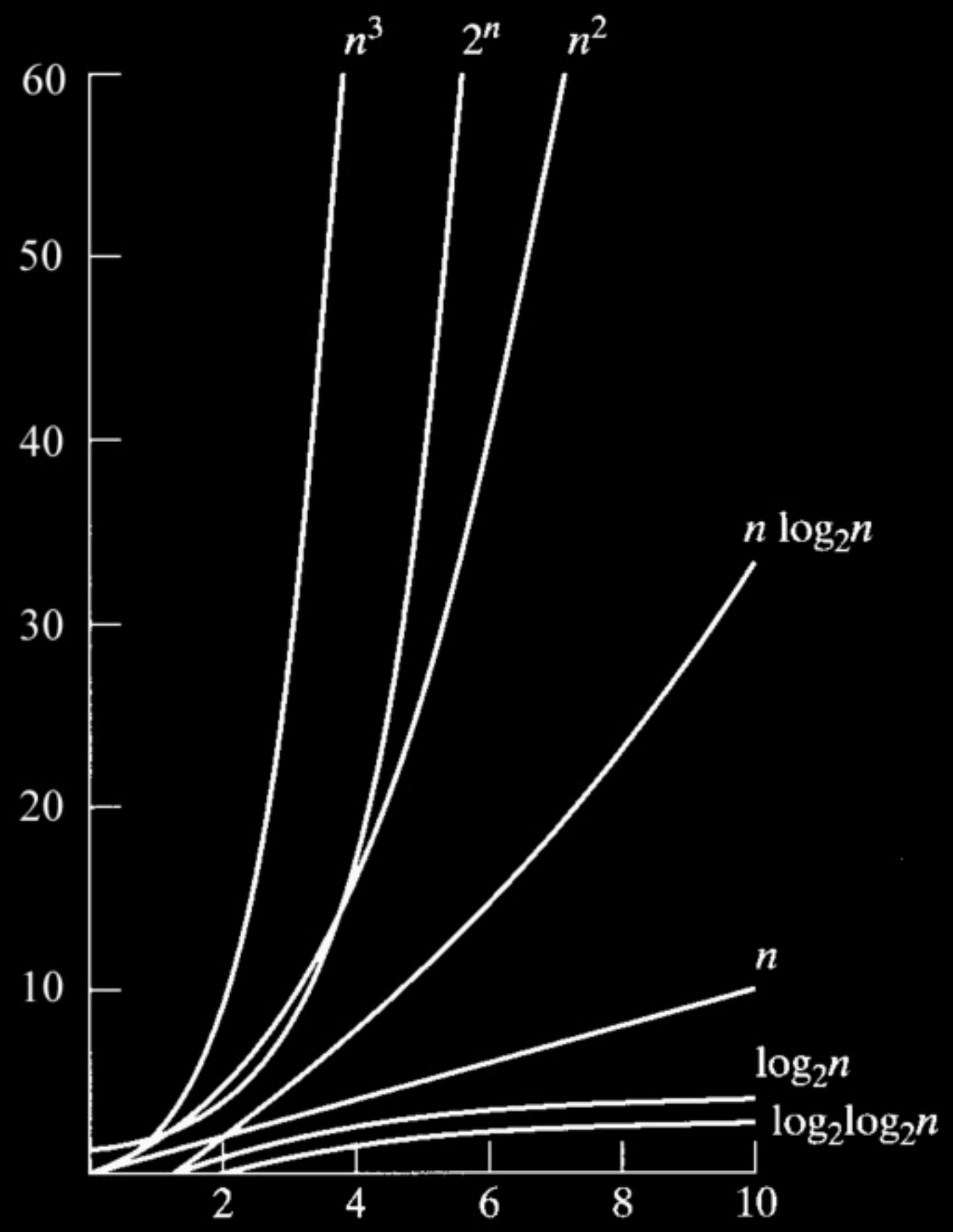
an algorithm

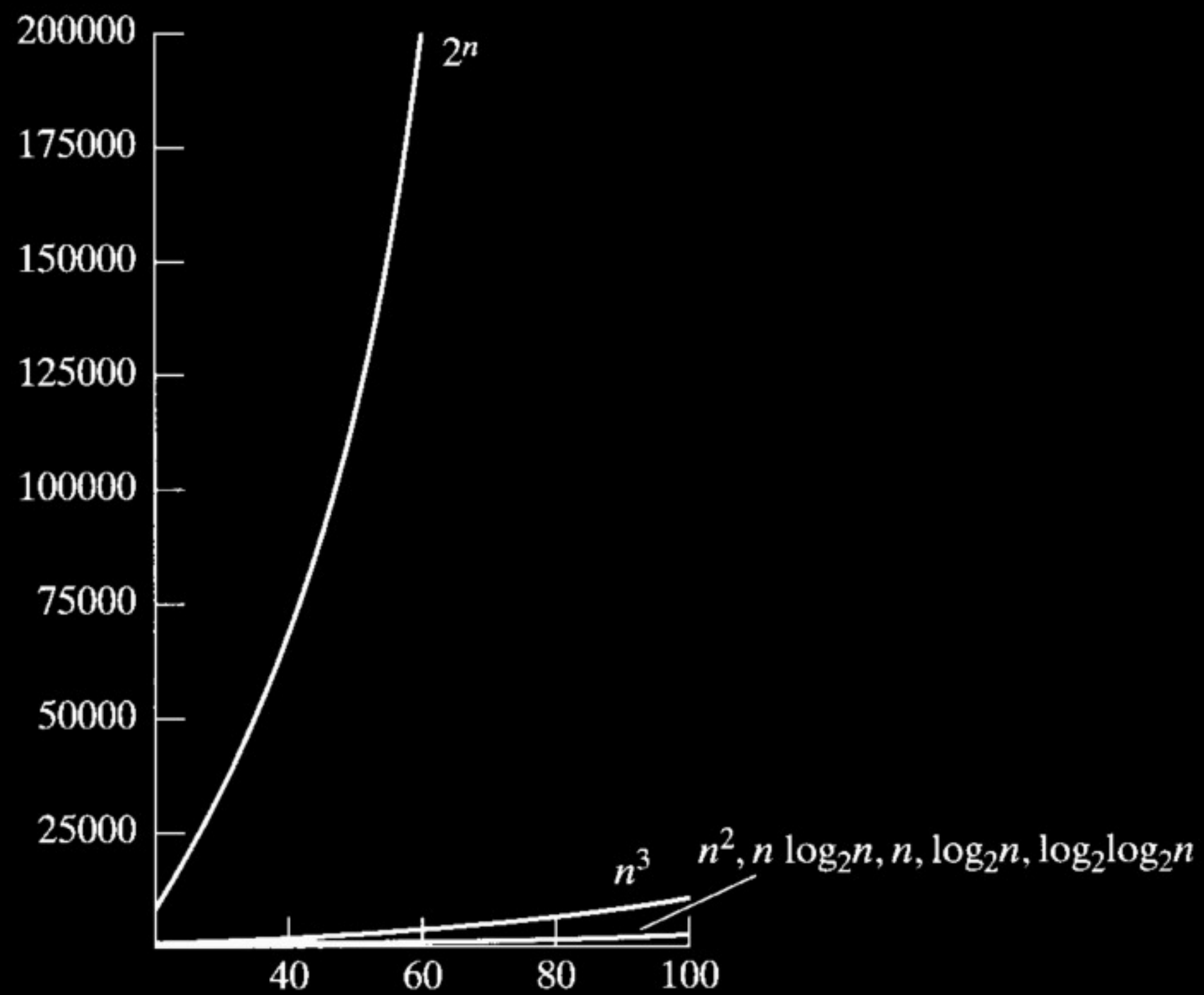
1. stand up and think of the number 1
2. pair off with someone standing, add your numbers together, and adopt the sum as your new number
3. one of you should sit down; the other should go back to step 2

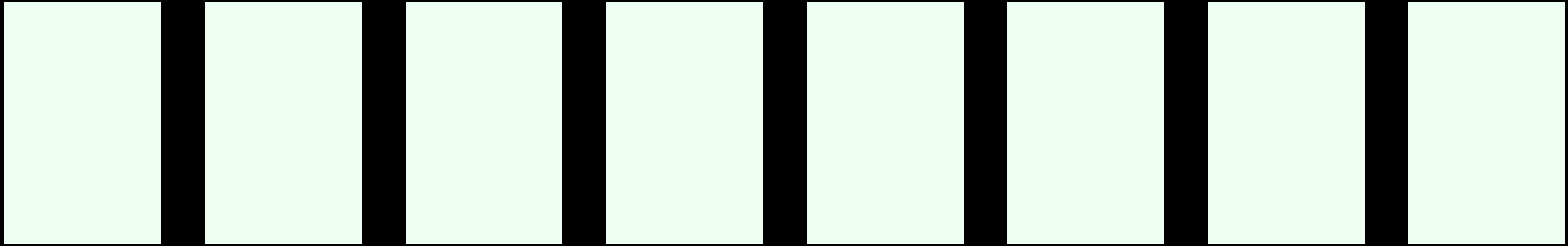
another algorithm

1. stand up if in orchestra section
2. pair off with someone standing; stay standing if you're taller, sit down if you're shorter; break tie randomly
3. if still standing, go to step 2









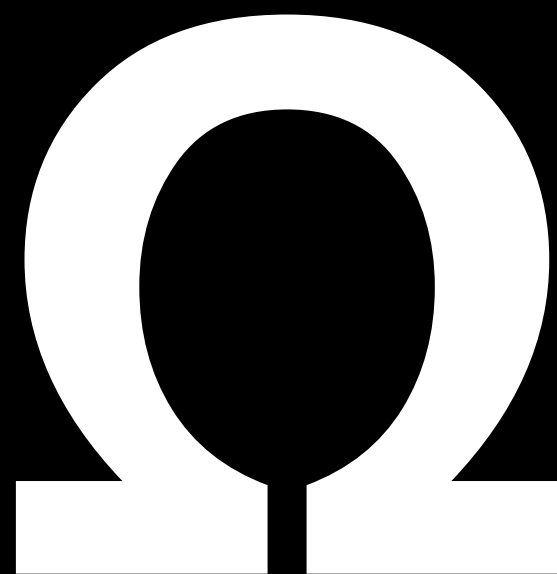
4 2 6 8 1 3 7 5

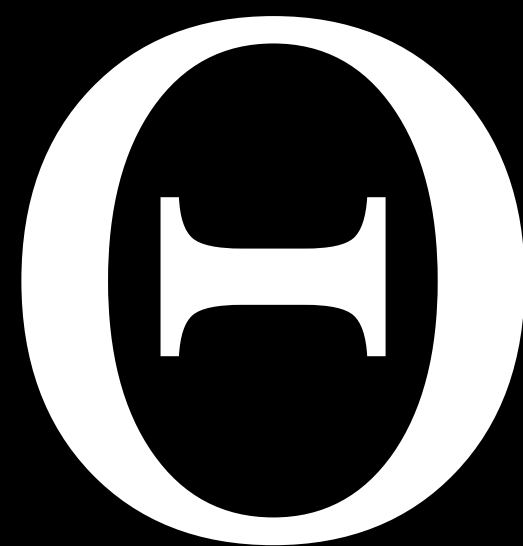
bubble sort

selection sort

insertion sort

O





merge sort

On input of n elements:

If $n < 2$

Return.

Else:

Sort left half of elements.

Sort right half of elements.

Merge sorted halves.

$$T(n) = 0, \text{ if } n < 2$$

$$T(n) = T(n/2) + T(n/2) + n, \text{ if } n > 1$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot T(4) + 8$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot T(4) + 8$$

$$T(4) = 2 \cdot T(2) + 4$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot T(4) + 8$$

$$T(4) = 2 \cdot T(2) + 4$$

$$T(2) = 2 \cdot T(1) + 2$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot T(4) + 8$$

$$T(4) = 2 \cdot T(2) + 4$$

$$T(2) = 2 \cdot T(1) + 2$$

$$T(1) = 0$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot T(4) + 8$$

$$T(4) = 2 \cdot T(2) + 4$$

$$T(2) = 2 \cdot 0 + 2$$

$$T(1) = 0$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot T(4) + 8$$

$$T(4) = 2 \cdot 2 + 4$$

$$T(2) = 2 \cdot 0 + 2$$

$$T(1) = 0$$

$$T(16) = 2 \cdot T(8) + 16$$

$$T(8) = 2 \cdot 8 + 8$$

$$T(4) = 2 \cdot 2 + 4$$

$$T(2) = 2 \cdot 0 + 2$$

$$T(1) = 0$$

$$T(16) = 2 \cdot 24 + 16$$

$$T(8) = 2 \cdot 8 + 8$$

$$T(4) = 2 \cdot 2 + 4$$

$$T(2) = 2 \cdot 0 + 2$$

$$T(1) = 0$$

64

$n \log n$

to be continued...