

# 15-451 Assignment 01

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## 1a.

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Compute  $n^{3/4}$  in constant time.

Use DeterministicSelect to select the  $n^{3/4}$ th largest number in  $O(n)$  time.

Then filter out the elements greater than or equal to it in  $O(n)$  time.

Now sort the  $n^{3/4}$  numbers using mergesort in  $O(n^{3/4}\log(n^{3/4}))$  time.

The algorithm seems to be dominated by the latter expression, but it can be reduced to  $O(n)$  as follows:

$$\begin{aligned} &O(n^{3/4}\log(n^{3/4})) \\ &\leq O(\tfrac{3}{4}n^{3/4}\log(n)) \end{aligned}$$

Notice that  $O(n^{1/4}) \geq \log(n)$  so we can make the following substitution:

$$\begin{aligned} &\leq O(\tfrac{3}{4}n^{3/4}n^{1/4}) \\ &\leq O(n) \end{aligned}$$

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## 1b.

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Lorem ipsum

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## 2

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Lorem ipsum