

CSCI 305 HW 9

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November 15, 2023

1) Calculate the amount of work for

- $A = [1, 2, 3, \dots, n] \rightarrow O(n \log n)$
- $A = [n, n-1, n-2, \dots, 1] \rightarrow O(n \log n)$
- A with n distinct elements $\rightarrow O(n \log n)$
- A with n identical elements $\rightarrow O(n \log n)$

It is apparent that heap sort's best, worst, and average runtime is not dependent on its input.

2) Trace what happens when you call...

- Insert(A , 30)
 - We increase the heap's size by 1.
 - We insert 30 at the end of the heap.
 - We swap 30 with the 27.
- Insert(A , 40)
 - We increase the heap's size by 1.
 - We insert 40 at the end of the heap.
 - We swap 40 with the 27.
 - We swap 40 with the 34.
 - We swap 40 with the 36.
- Increase-Key(A , 8, 35)
 - We increase the key at index 8 ($A[8] = 22$) by 35 ($A[8] += 35$).
 - We swap 63 with the 34.
 - We swap 63 with the 36.
- Increase-Key(A , 6, 38)
 - We increase the key at index 6 ($A[6] = 29$) by 38 ($A[6] += 38$).
 - We swap 67 with the 30.
 - We swap 67 with the 36.
- Extract-Max(A)
 - We swap 36 with the 23.
 - We decrease the heap's size by 1.
 - We max-heapify the heap.
 - We swap 21 with the 34.
 - We swap 21 with the 28.
 - We swap 21 with the 24.

