

Sorting: Homework

31/3/2020

1. By using the code at:

https://github.com/albertocasagrande/AD_sorting

implement **INSERTION SORT**, QUICK SORT, **BUBBLE SORT**, **SELECTION SORT**, and HEAP SORT.

2. For each of the implemented algorithm, draw a curve to represent the relation between the input size and the execution-time.
3. Argue about the following statement and answer the questions
 - (a) HEAP SORT on a array A whose length is n takes time $O(n)$.
 - (b) HEAP SORT on a array A whose length is n takes time $\Omega(n)$.
 - (c) What is the worst case complexity for HEAP SORT?
 - (d) QUICK SORT on a array A whose length is n takes time $O(n^3)$.
 - (e) What is the complexity of QUICK SORT?
 - (f) BUBBLE SORT on a array A whose length is n takes time $\Omega(n)$.
 - (g) What is the complexity of BUBBLE SORT?
4. Solve the following recursive equation:

$$T(n) = \begin{cases} \Theta(1) & \text{if } n = 32 \\ 3 * T\left(\frac{n}{4}\right) + \Theta\left(n^{3/2}\right) & \text{otherwise} \end{cases}$$