

CS344: HW1

September 21, 2017

- Out Sept 21, Due week of Oct 2. Hand it to your TAs at the beginning of the recitation. No late homeworks please.
- Sort these functions in asymptotic order as precisely as possible (for example, use o when applicable and Θ when applicable, etc).

$$n^2 + \log n, (1/10)n \log n, 2^{\log^2 n}, \sqrt{n^{\log n}}, \log(n!), 2^n$$

Formally show the ordering relationship.

- Is $2^{2n} = O(2^n)$? Formally argue your answer.
- Solve

$$T(n) = T(\sqrt{n}) + n$$

with $T(1) = 1$.

- Someone designs a sorting algorithm that solves 3 problems of size $n/3$ each and combines the answers in $f(n)$ time to solve the problem of size n . If the entire sorting algorithm takes $O(n \log n)$ time, what is $f(n)$? If the entire sorting algorithm takes $O(n^2)$ time, what should be $f(n)$? Formally show your answers in each case.