

# Problem Set 1

CS 331H

Due Monday, February 4

General rules:

- For full credit, you must justify your work; if it is not obvious, a proof should be provided.
- Collaboration is encouraged, but you must write up the solutions on your own and acknowledge your collaborators at the top of your solutions.

1. Recursive time bounds: give a big-O bound for  $T(n)$  given each of the following recursive formulas:

(a)  $T(n) = 3T(n/4) + n \log n$

(b)  $T(n) = 2T(n/2) + \sqrt{n}$

(c)  $T(n) = 5T(n/4) + n$

(d)  $T(n) = T(2n/3) + T(n/3) + n/6$ .

with the base case  $T(1) = 1$ .

2. There's a Jupyter Notebook linked from the class webpage. Run through it, then answer the questions at the end. Don't wait till the last day to do this: setting up the required libraries may take some time.