

Homework Assignment 2

This assignment is due by Tuesday February 10 (in class). Assignments should be handed in *before the class begins*.

Problem 1: Briefly discuss the qualitative difference between the average run time of a deterministic algorithm (such as quicksort) and the expected run time of a randomized algorithm (such as randomized quicksort).

Problem 2: Solve exercises 7.1-3, 7.1-4 (page 148), 7.2-4 (page 153), and 7.4-4 (page 159) in the textbook.

Problem 3: Solve the following recurrences using the master theorem. Clearly justify using the various cases of the theorem.

- $T(n) = 9T(\frac{n}{3}) + n^2 + \frac{n}{2} + 1$
- $T(n) = 5T(\frac{n}{2}) + n^2$
- $T(n) = 12T(n/4) + n^2$

Problem 4: Solve exercise 4.3-2 (page 75) in the textbook.

Problem 5:

- Analyze the recurrence $T(n) = \sqrt{n} T(\sqrt{n}) + n$ using unfolding or recursion trees
- Now give an inductive proof that your bound from (i) is indeed correct.