

Practice Questions for Test 1

1. Given a pseudocode for a recursive algorithm. What's the recurrence relation for its runtime? What does the recurrence solve to using the master theorem? Come up with a guess for the solution (expansion method or recursion tree) and prove it by induction.
2. Big-Oh ranking: Given a set of runtimes, rank them according to which of them are in big-Oh of which and which of them are in Theta of each other. Just like problem 2 on the first homework, just that you don't have to prove your results.
3. Code snippets: Given a code snippet (just like problem 1 on the first homework), what's its runtime? Shortly argue why.
4. Ternary heaps: Consider a ternary max-heap (so, one where each node has 3 children). What are the formulas for the children and for the parent?
5. Heaps: Where is the minimum located in a max-heap?
6. Big-Oh: If $f \in O(g)$ and $g \in O(h)$ show that $f \in O(h)$.
7. Probability: Consider rolling two fair 6-sided dice. What's the probability that two sixes come up? Compute the expected sum of the dice. (Come up with a random variable, and use the calculator to sum up the lengthy expression. Of course, in the exam the question would be much easier such that you wouldn't need a calculator).
8. Some question about recursive algorithms regarding Strassen's algorithm or Fibonacci numbers or something similar....