

Homework Set #1

Due: Sept 18

1. (10 points) **Comparing Functions:** What is the smallest integer value of $n > 1$ such that an algorithm whose running time is $53n(\log_2 n)^3$ runs slower than an algorithm whose running time is $185n(\log_2 n)^2$ on the same machine? Justify your answer.
2. (10 points) Exercise 1.2-2 (page 13).
3. (10 points) Using Figure 2.2 on p. 17 as a model, illustrate the operation of **INSERTION-SORT** on the array $A = \langle 798, 4, 123, 549, 12 \rangle$.
4. (10 points) Using Figure 2.4 on p. 33 as a model, illustrate the operation of **MERGE-SORT** on the array $A = \langle 798, 4, 123, 549, 12 \rangle$.
5. (20 points) Exercise 2.3-4 (page 37).
6. (20 points) Use a recursion tree to find a closed form solution to the following recurrence:

$$T(n) = \begin{cases} 1 & \text{if } n = 0 \\ 3T(n-2) + 5n & \text{if } n > 0 \end{cases}$$

Assume that $n \geq 0$ is an even integer.