

Due at the start of class Wednesday, June 17, 2009.

Problem 1. Consider the following recurrence, defined for n a power of 5:

$$T(n) = \begin{cases} 19 & \text{if } n = 1 \\ 3T(n/5) + n - 4 & \text{otherwise} \end{cases}$$

- (a) Solve the recurrence exactly using the iteration method. Simplify as much as possible.
- (b) Use mathematical induction to verify your solution.

Problem 2. Use the formulas derived in class to obtain exact solutions to the following two recurrences.

- (a) Let n be a power of 2.

$$T(n) = \begin{cases} 4 & \text{if } n = 1 \\ 5T(n/2) + 3n^2 & \text{otherwise} \end{cases}$$

- (b) Let n be a power of 4.

$$T(n) = \begin{cases} 3 & \text{if } n = 1 \\ 2T(n/4) + 4n + 1 & \text{otherwise} \end{cases}$$

Problem 3. Consider the following recurrence.

$$T(n) = \begin{cases} 0 & \text{if } n = 0 \\ T(\lfloor n/2 \rfloor) + T(\lfloor n/4 \rfloor) + 3n & \text{otherwise} \end{cases}$$

Use constructive induction to find a constant c such that $T(n) \leq cn$.

Problem 4. Do Problem 4-2 on page 85 of CLRS.