CSE 3101, Summer 2010

Practice problems 3

June 13, 2010

1. Given the recurrence $T(1) = 1$ and for $n > 1$, $T(n) = 2T(n/2) + n/\lg n$, can we apply the Master theorem? Justify your answer.

2. Prove that the following algorithm is correct.

   FIB(n)
   ```
    1   // return F_n the n^{th} Fibonacci number
    2   if n = 0
    3      then return 0
    4      else  last ← 0
    5            current ← 1
    6            for i ← 2 to n
    7            do temp ← last + current
    8                 last ← current
    9                 current ← temp
   10   return current
   ```

3. Q2, page 232 of PoA.

4. Solve the following recurrences.

   (a) $T(1) = 1$ and for all $n \geq 2$, $T(n) = 2T(n-1) + n^2 - 2n + 1$.

   (b) $T(1) = 1$ and for all $n \geq 2$, $T(n) = nT(n-1) + n$.

   (c) $T(1) = 1$ and for all $n \geq 2$, $T(n) = \sum_{i=1}^{n-1} T(i) + n^2$.