Response to 'Muddiest Part of the Recitation Cards'

(10 respondents)

1) *When do we need all the log identities in finding Big-O?*

   You don’t need all of the log identities at all times. You have to pick and choose the required identity in order to solve/simplify the recurrence equation. For example, when you have to find the base case, you use $n = 2^k$, then you can represent $k$ as $\log_2 n$.

2) *In algorithm classes, do they prove similar forms to the master method for different recurrence equations? Is that the non-simplified master-method?*

   What we looked at in class is the solution to recurrence equations of the form:
   $$ T(n) = aT(n/b) + cn^k $$

   The form that you will see in algorithm classes, treats the second term in the right hand side to be generic i.e.
   $$ T(n) = aT(n/b) + f(n) $$

   In this case, the master theorem appears as shown below:

   $$ \begin{cases} 
   \Theta(n^{\log_b a}) & f(n) = O(n^{\log_b a - \varepsilon}) \\
   \Theta(n^{\log_b a \log n}) & f(n) = \Theta(n^{\log_b a}) \\
   \Theta(f(n)) & f(n) = \Omega(n^{\log_b a + \varepsilon}) \text{ AND } af(n/b) < cf(n) \text{ for large } n
   \end{cases} $$

   \varepsilon > 0 \quad c < 1

3) *Why cannot I from example 2 be expressed in terms of N?*

   Example 2, uses the following code snippet

   ```
   type Int_Array is array (Integer range <>) of Integer;
   
   procedure Measure (A : Int_Array ) is
   ```
Sum : Integer := 0;
begin
for I in A'range loop
  for J in 1 .. I loop — only change to Ex 1
    Sum := Sum + A(J);
  end loop;
end loop;
end Measure;

The ‘I’ value in the outer loop changes in every iteration with a maximum value of n. It cannot be expressed as a simple function in n.

4) Still muddy about coming up with T(n) equations from recurrence problems. Specifically unclear on how to solve for O(n) w/o Master method.

When you are not using the master method, use iteration (Lecture 13 last semester) to solve the recurrence equation. If the T(n) is a homogeneous function in n (all the terms are functions of n), then find the most significant term to determine the Big-O. See examples in both the Recitation 3 and Lecture 9 slides.

6) No mud, cool stuff, good lecture (6 students)