

**CMPS 101**  
**Spring 2008**  
**Homework Assignment 5**

1. (15 Points)

Consider the function  $T(n)$  defined by the recurrence formula

$$T(n) = \begin{cases} 6 & 1 \leq n < 3 \\ 2T(\lfloor n/3 \rfloor) + n & n \geq 3 \end{cases}$$

- a. (5 Points) Use the iteration method to write a summation formula for  $T(n)$ .
- b. (5 Points) Use the summation in (a) to show that  $T(n) = O(n)$
- c. (5 Points) Use the Master Theorem to show that  $T(n) = \Theta(n)$

2. (20 Points)

Use the Master theorem to find asymptotic solutions to the following recurrences.

- a. (5 Points)  $T(n) = 7T(n/4) + n$
- b. (5 Points)  $T(n) = 9T(n/3) + n^2$
- c. (5 Points)  $T(n) = 6T(n/5) + n^2$
- d. (5 Points)  $T(n) = 6T(n/5) + n \log(n)$