

## CS 3100 / In-class Activity 3, Divide and Conquer

Name	Computing ID
<i>Your Name:</i>	

**In class:** You must work in teams of 2, 3 or 4. Each person writes answers and turns in the sheet at end of class.

**Missed class?** Work alone and answer to the best of your ability. Submit to GradeScope by 9am on the 2nd day after in-class activity.

1. Use the Master Theorem to find the order-class for this recurrence:

$$T(n) = 2T(n/2) + 15n^3$$

If this is Case 3, make sure it meets the criteria for applying Case 3. This would include checking if  $a f(n/b) \leq c f(n)$  for constant  $c < 1$  and sufficiently large  $n$

## 2. Fast Exponentiation:

Given a pair of positive integers  $a$  and  $n$ , devise a divide and conquer algorithm that computes  $a^n$  using only  $O(\log n)$  calls to a multiplication routine. Discuss how you could prove its correctness (but don't write down that proof).