**CS430 Lecture 3 Activities**

Opening Questions

1. What are the three steps in an inductive proof?

2. Describe an efficient divide and conquer algorithm to count the number of times a character appears in a string of length n.

Asymptotic Analysis (more details)



1. Use the definition of omega to show n^(1/2) = Omega(log n)



2a. Use the definition of theta to show 3n^3-4n^2+37n = Theta(n^3)

2b. Use the definition of theta to show n^2 +3n^3 = Theta(n^3)

Divide and Conquer Algorithms

* Divide – divide the problem into sub-problems that can be solved independently
* Conquer – recursively solve each sub-problem
* Combine – possibly necessary, combine solutions to sub-problems

Not all problems can be solved with the divide and conquer approach. Maybe sub-problems are not independent, or solutions to sub-problems cannot be combined to find solution to main problem.

3. Write a recursive algorithm for Binary Search. Write and solve its recurrence relation.

4. Write a recursive algorithm for Selection Sort (or insertion sort or bubble sort). Write and solve its recurrence relation.

Inductive Proofs (needed in next lecture to prove a solution to a recurrence relation)

