

Name: _____ Score: ____/ 16 circle your Section # 01(3rd) 02 (4th)

1. (1) With another student, try to write a precise definition of “ $f(n)$ is in $O(g(n))$ ”
2. (1) Prove using the formal definition: If $f(n) \in O(h(n))$ and $g(n) \in O(h(n))$, then $f(n)+g(n) \in O(h(n))$

3. (3) For each of the cases of $\lim_{n \rightarrow \infty} \frac{f(n)}{g(n)}$
What can you conclude about asymptotics?

Limit is 0 →

Limit is a non-zero positive constant →

Limit is infinite →

4. (1) How many matrix multiplications are needed in order to compute the n th Fibonacci number using the matrix approach? Explain briefly.
5. (1) Why shouldn't we just compute Fibonacci numbers by using the formula (seen in CSSE 230) that uses powers of the golden ratio?
6. (1) When we add three 1-digit integers, how many digits can be in the answer?

Is this independent of the base (i.e, the same for decimal, binary, hexadecimal, etc.).

7. (1) How does the previous question apply to the analysis of the addition of two n -bit non-negative integers?

8. (1) What is the running time of the "standard" algorithm for multiplying multiple-digit numbers?

9. (1) What is the running time of the "European" algorithm for multiplying multiple-digit numbers?

10. (1) What is the recurrence for the first Divide and Conquer multiplication algorithm?

What is its solution?

11. (1) Gauss's algorithm for multiplying two complex numbers replaces _____ integer multiplications by _____.

12. (1) What is the recurrence relation for the Gaussian Divide and Conquer multiplication algorithm?

What is its solution?

13. (1) Tell me about anything from today's lecture that you found confusing or feel that we need to spend more time on?.
(or write N/A).

14. (1) What questions do you have (from today's lecture, from the reading, or from the course in general), or write N/A.