**MA/CSSE 473 Day 03 Announcements and Summary**

**Announcements:**

1. HW1 Due today at 11:55PM. A bit smaller than HW 2, due Thursday, Sept. 11. I suggest that you begin HW 2 before HW 1 is due.
2. HW3 and HW4 have been updated for this term.

**Main ideas from today:**

1. With another student, try to write a precise, formal definition of "t(n) is in O(g(n))"

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

   Limit is 0 ➔

   Limit is a non-zero positive constant ➔

   Limit is infinite ➔

4. 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.).

5. How does the previous question apply to the analysis of the addition of two k-bit non-negative integers?

6. What is the running time of the "standard" algorithm for multiplying two n-digit numbers?

7. What is the running time of the "European" algorithm for multiplying multiple-digit numbers?

8. What is the recurrence for the first Divide and Conquer multiplication algorithm?

What is its solution?

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

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

What is its solution?