"Questions and Answers" (Q&As)

Ways to prepare for an exam.

- Watch the lectures and do the reading each week.
- Review lecture slides before the exam.
- Try solving problems from old exams. ← Problem: Not many old exams available

One topic of class meetings for COS 488 will be to develop good questions for future exams.

Properties of a good exam question.

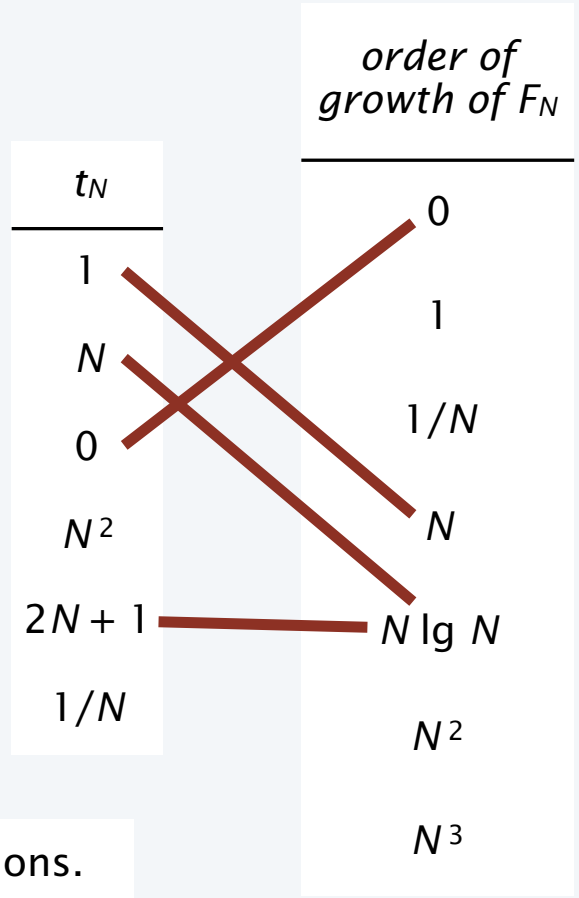
- Easy to understand.
- Easy to grade.
- Solvable in 10 minutes or less (but not trivial).
- Tests understanding of an important topic.
- "Fair" (no tricks)
- Teaches something (optional but desirable)

The ability to ask good questions is a skill everyone should learn (but is often overlooked).

AofA Intro Q&A 1

Q. Match each "toll function" at left with the order of growth of the solution at right for the Quicksort recurrence

$$F_N = t_N + \frac{1}{N} \sum_{1 \le k \le N} \left(F_{k-1} + F_{N-k} \right) \quad \text{with} \quad F_0 = 0$$



Note. We try hard to avoid answers that depend on detailed calculations.

Simplifying the recurrence

$$C_N = N + 1 + \sum_{1 \le k \le N} \frac{1}{N}(C_{k-1} + C_{N-k})$$

both sums are $C_0 + C_1 + \ldots + C_{N-1}$

Apply symmetry.

$$C_N = N + 1 + \frac{2}{N} \sum_{1 \le k \le N} C_{k-1}$$

Multiply both sides by N.

$$NC_N = N(N+1) + 2 \sum_{1 \le k \le N} C_{k-1}$$

Subtract same formula for $N-1$.

$$NC_N - (N-1)C_{N-1} = 2N + 2C_{N-1}$$

Collect terms.

$$NC_N = (N+1)C_{N-1} + 2N$$

$$Nt_N - (N-1)t_{N-1}$$

IMPORTANT: Holds for $N > 1$ with $C_1 = 1$