CSC 165

bounds and problems

week 9, lecture 3

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recall the problem

You can get a handout to work on in groups. Here's the gist of the problem:

Suppose you're given the list:

37	93	0	23	79	65	49	81	67	8	32	29	96	76	15	9	51	14	29	69

Can you find one or more longest non-decreasing sequences?

For example, 37, 93, 96 is a sequence that's non-decreasing,

but you can easily find longer ones.

Sequences are ordered, but need not be contiguous

State of the art, so far: focus on the longest non-decreasing sequence ending at a particular index

Let $\mathcal{F} = \{f : \mathbb{N} \mapsto \mathbb{R}^{\geq 9}\}$

Is it true that $\forall f, g \in \mathcal{F}, f \in \mathcal{O}(g) \Rightarrow f \in \mathcal{O}(g^2)$?

Is it true that $\forall f, g \in \mathcal{F}, f \in \mathcal{O}(g) \vee g \in \mathcal{O}(f)$?

some calculus

How do you evaluate

$$\lim_{x \to \infty} \frac{x}{\log x}$$

try L'Hôpital's rule (the limit of the derivatives)
what does it mean?

If the limit of the ratio is infinity, then for every $x_1 \in \mathbb{R}^+$,
$\exists x_2 \in \mathbb{R}^+, \forall x \in \mathbb{R}, x \geq x_2 \Rightarrow \frac{x}{\log x} > x_1$