growing sequences

Work with 1 or 2 other students, and choose one of your group as the recorder. The recorder should keep a written record of his/her group's discussion of the problem below, and you may use this in writing an account of this problem-solving session. Use the following headings to organize the discussion:

UNDERSTAND THE PROBLEM: What's given (what's the input)? What's required (what's the output)? Can you re-express either the input or the output in useful ways?

DEVISE A PLAN: *Before* actually trying to solve the problem, think of one or more approaches, and try to guess what their advantages might be.

CARRY OUT THE PLAN(S):

LOOK BACK: Did your approach(es) work? How can you verify the result? If you have one solution, can you improve it?

ACKNOWLEDGE WHEN AND HOW YOU'RE STUCK: Is there a particular part of the problem that's a barrier? Write it down, and see whether there's a way around it.

Find a longest non-decreasing sequence in a list of numbers. For example:

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

One non-decreasing subsequence is 37, 93, 96, but I doubt it's the longest.

Can you find a technique that will work for any finite list? Can you write down a sequence of steps, or a program, that reliably finds a longest sequence?

Make sure you complete the first two steps above (understand the problem and devise a plan). If you're stuck for more than 5 minutes, you may turn over the sheet and use the clues there.

I already know one solution to the problem. I'm even more interested in how you get to a solution, than the solution itself. You're welcome to discuss the problem on the course bulletin board, or write it up at the URL at the bottom of the page.

You can continue working on this problem at:

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https://wwwcgi.cdf.toronto.edu/~heap/cgi-bin/Solvent/wiki.pl?Problem_Solving_Home_Page/GrowingSequences
Userid:   sleuth
Password: eureka
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HINT 1, SCALE DOWN: You can certainly solve the problem when the list has just one element. Consider problems that are only slightly larger than that. Do any patterns emerge?

HINT 2, CHANGE THE PROBLEM SLIGHTLY: Focus on one position in the list. Can you write down the length of the longest list that ends in that position?