

Submit your answers to Canvas for the problems given below.

1. Which one is asymptotically larger: $\lg(\lg^* n)$ or $\lg^*(\lg n)$? Show explicitly.

2.

Use the following ideas to develop a nonrecursive, linear-time algorithm for the maximum-subarray problem. Start at the left end of the array, and progress toward the right, keeping track of the maximum subarray seen so far. Knowing a maximum subarray of $A[1 \dots j]$, extend the answer to find a maximum subarray ending at index $j + 1$ by using the following observation: a maximum subarray of $A[1 \dots j + 1]$ is either a maximum subarray of $A[1 \dots j]$ or a subarray $A[i \dots j + 1]$, for some $1 \leq i \leq j + 1$. Determine a maximum subarray of the form $A[i \dots j + 1]$ in constant time based on knowing a maximum subarray ending at index j .

Explain the steps of your algorithm. Implement it using Java and test it for the following sequence of numbers in the change array:

13, -3, -25, 20, -3, -16, -23, 18, 20, -7, 12, -5, -22, 15, -4, 7

3.

Using the master method in Section 4.5, you can show that the solution to the recurrence $T(n) = 4T(n/3) + n$ is $T(n) = \Theta(n^{\log_3 4})$. Show that a substitution proof with the assumption $T(n) \leq cn^{\log_3 4}$ fails. Then show how to subtract off a lower-order term to make a substitution proof work.