Ex 2.2.8: Suppose that Algorithm 2.4 is modified to skip the call on merge() whenever $a[mid] \leq a[mid+1]$. Prove that the number of compares used to *mergesort* a *sorted array* is *linear*.

Solution:

- Since array is sorted, therefore it already satisfies $a[mid] \leq a[mid+1]$.
- $C(N) = C(\frac{n}{2}) + C(\frac{n}{2}) + 1$. Notice how compared to Ex 2.2.7, the equation changed from n to constant 1. This is because we only do 1 comparison.
- $T(n) = 2T(\frac{n}{2}) + 1$
- $T(1) = 1$
- $T(n) = n$