Graded Problem

Brito's youngest kid is learning the natural numbers. To practice, he writes a list of natural numbers, starting from the number 1. In doing so, he repeats exactly one, resulting in a list A of N numbers, such that there is exactly one repeated, and A is non decreasingly sorted. Help Brito figure out which number is repeated.

Design a divide and conquer algorithm that takes as input a sorted array A, of length N, containing all the integers from 1 to N-1 exactly once, except for one which appears twice. Your algorithm should find the value of the only repeated element.

Describe your algorithm in words (no pseudocode!) and justify its correctness. State and justify its runtime. Faster (and correct) in asymptotic Big O notation is worth more credit.

Brute force solutions will receive little to no credit.

You will upload a pdf of your **typed** solution. **Handwritten solutions will be penalized.**