In this project, you are given a unimodal array of \( n \) integers and your task is to find the maximum integer in the array in \( \Theta(\log n) \) time. An unimodal array of integers is an array with entries that monotonically increase up to the maximum integer value and then monotonically decrease for the rest of the array. For example: \{2, 5, 8, 9, 12, 15, 21, 17, 10, 4\} is a unimodal array of ten integers that increase from 2 ... 21 and then decrease from 21 ... 4. The integer 21 is the maximum value of the integer in the array.

You could use a modified version of the binary search algorithm discussed in Module 2 to design and implement an algorithm for the above unimodal array maximum element problem.

**Documentation (in both the hard copy report and video):**

1. Provide a pseudo code of a \( \Theta(\log n) \) algorithm for the above problem and explain its working.
2. Explain your actual code and execute it with the following three types of unimodal arrays of size at least 10 integers:
   - (i) The maximum integer is the first element in the array: *this is basically an array of integers sorted in descending/reverse order*
   - (ii) The maximum integer is the last element in the array: *this is basically an array of integers sorted in increasing/ascending order*
   - (iii) The array has a sequence of monotonically increasing sequence of at least three integers followed by a monotonically decreasing sequence of at least three integers

**Submission:** Submit the hard copy of the report with the above documentation in class and send the link for the recorded video via Google drive to natarajan.meghanathan@jsu.ms