First and Last Indices of an Element in a Sorted Array

AHA: Get Ranges

Imagine that you're given an array of # & sorted & a target num find first & last indices of that number

[1, 3, 3, 5, 7, 8, 9, 9, 15]
0 1 2 3 4 5 6 7 8

Target: 9

Output: [6, 7]

↳ Binary Search ~ Can get us log times (Only need to traverse half of the list)

- Use binary search to find the first digit and last
  - 2 binary searches

Binary Search:

- Goal: look through sequence & determine if an item is in that sequence or not
- Take Midpoint
  - ↳ If higher look right
  - ↳ If lower look left

Complexity

n size ~ each iteration reduced by half

$n \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{n}{2^k} \rightarrow n = 2^k \rightarrow k = \log_2 n$