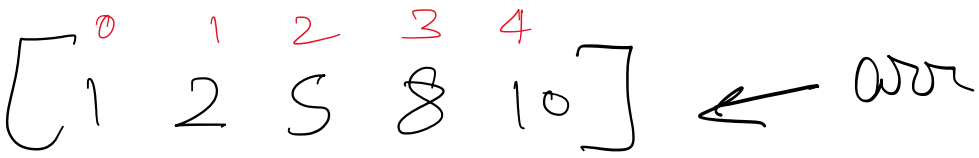
Lower Bound



$x = 4$

$arr[index] \geq x$

→ Lower bound

Example $5 \geq x$

$\Rightarrow arr[2] \geq x$

$\therefore$ 2 is the lower bound

Example $arr = [1, 2, 3, 3, 3, 6]$ (indices 0, 1, 2, 3, 4, 5)

$x = 3$

$\therefore$ Lower bound of 3 is 2nd index

$\because arr[2] \geq x$

Binary Search

arr = [1, 2, 2, 4, 8]

0 1 2 3 4

x = 5

mid

1st pass:
- low = 0
- high = 4
- mid = $\frac{0+4}{2}$ = 2

if arr[mid] ≥ x → # Candidate answer
- ans = mid
- high = mid - 1

else:
- low = mid + 1

2nd pass:
- low = 3
- high = 4
- mid = 3

arr[3] < x

∴ update low = mid + 1

3rd

pass { low = -1, high = 4, mid = 4

arr[4] ≥ x

ans = mid

ans = 4

high = mid - 1

4th pass { high = 3, low = 21

low > high

(loop terminate)