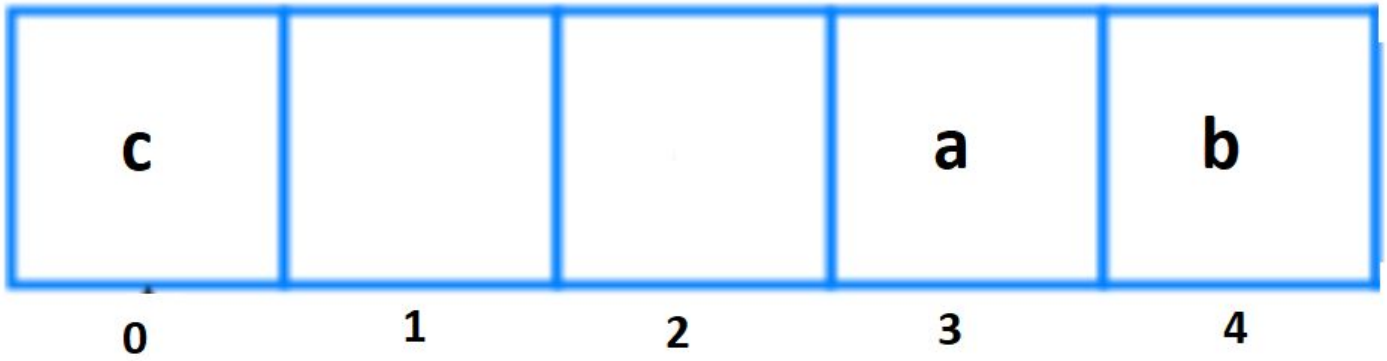
Given the current state of the ArrayQueue, what is its final state and values of len(a), j, and n after the following operations:

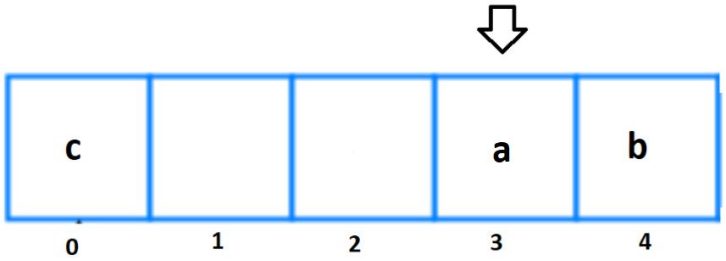
remove()
add(e)
remove()
remove()



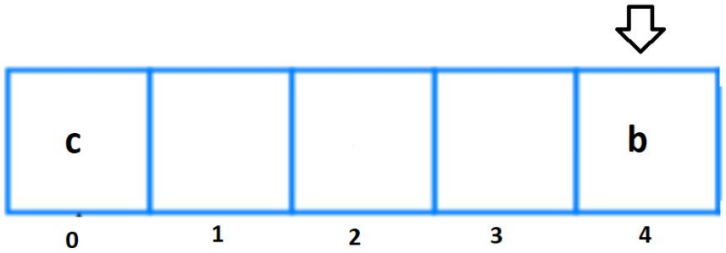
len(a) = 5
j = 3
n = 3

remove()

- Remove element at a[j]
- Increment j by 1
- Decrement n by 1
- Check if resize is needed
  - If len(a) >= 3 * n ? no



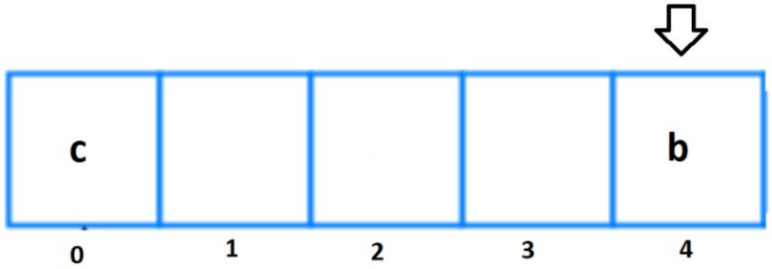
len(a) = 5
j = 3
n = 3



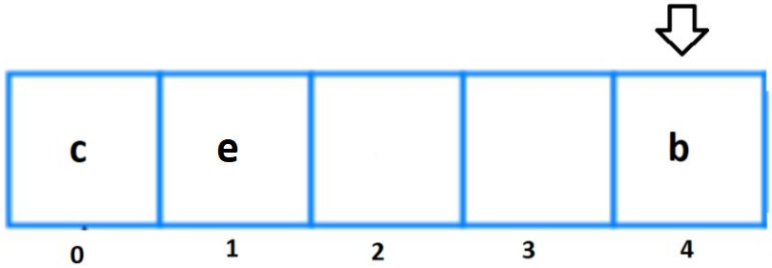
len(a) = 5
j= 4
n = 2

add(e)

- First check if resize is necessary;
  - if n == len(a)? no
- Add the element in a[(j + n) % len(a)]
  - a[(4 + 2) % 5]
  - a[1] ← e
- Increment n by 1



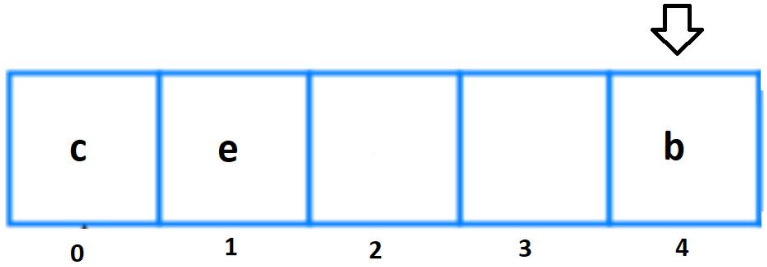
len(a) = 5
j = 4
n = 2



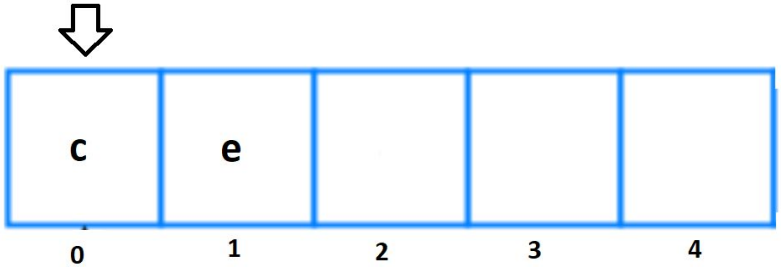
len(a) = 5
j = 4
n = 3

remove()

- Remove element at a[j]
- Increment j by 1
- Decrement n by 1
- Check if resize is needed
  - If len(a) >= 3 * n ? no



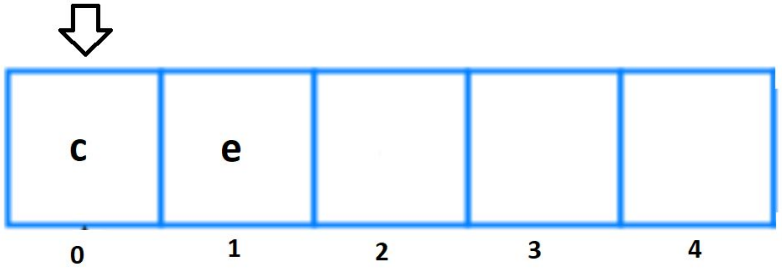
len(a) = 5
j= 4
n = 3



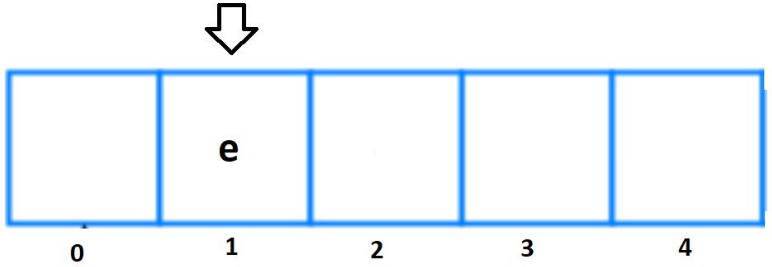
len(a) = 5
j = 0
n = 2

remove()

- Remove element at a[j]
- Increment j by 1
- Decrement n by 1
- Check if resize is needed
  - If len(a) >= 3 * n ? yes



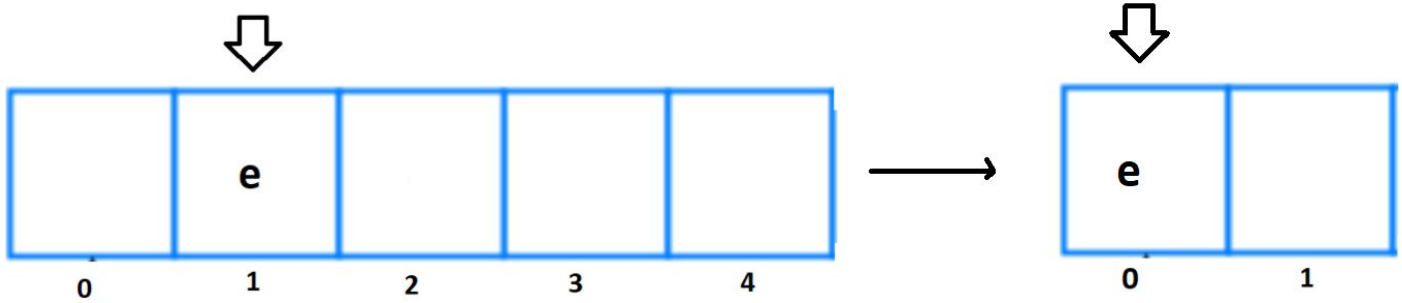
len(a) = 5
j = 0
n = 2



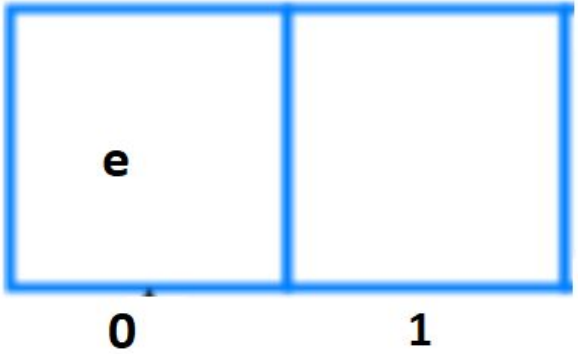
len(a) = 5
j = 1
n = 1

resize()

- Create new array that is 2n in size
- Copy all elements in a starting at j into the new array
- Set j to 0.



Final State and Values



len(a) = 2
j = 0
n = 1