Remove Element

```python
class Solution:
    def removeElement(self, nums: List[int], val: int) -> int:
        if nums == []:
            return 0

        original_length = len(nums)

        index = 0

        for i in nums:
            if i != val:
                nums[index] = i
                index += 1
        return index
```

an n operation, the loop invariant being array[0] to index should only be the elements that are not == val