## Find all duplicates in an Array.

Given an integer array nums of length n where all integers of nums are in range [1, n] & each integer appears once or twice, return an array of all the integers that appear twice.

[1, n]

Eg, n = 4

1, 2, 3, 3

First approach

1 2 3 3

We use two pointers & compare every pair of elements. It works, but it takes $O(n^2)$ time. Hence, it won't work

Second approach

We use a Hashset.

1 2 3 3

Hashset
1, 2, 3

Res [3]

We iterate over the array once & check if the element is present in the hashset. If not we add it to the hashset. If yes, then we append it to the result array.

This will also work, but in it is going to use extra space. Hence, we can't use it.

## Optimal Approach

We use the nums array as the extras space. We iterate through the array & as we go to their index & mark it (-) if visited. We add the - to the result array.