GREEDY

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- 3068
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3068. Find the Maximum Sum of Node Values

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There exists an **undirected** tree with `n` nodes numbered `0` to `n - 1`. You are given a **0-indexed** 2D integer array `edges` of length `n - 1`, where `edges[i] = [u_i, v_i]` indicates that there is an edge between nodes `u_i` and `v_i` in the tree. You are also given a **positive** integer `k`, and a **0-indexed** array of **non-negative** integers `nums` of length `n`, where `nums[i]` represents the **value** of the node numbered `i`.

Alice wants the sum of values of tree nodes to be **maximum**, for which Alice can perform the following operation **any** number of times (**including zero**) on the tree:

- Choose any edge `[u, v]` connecting the nodes `u` and `v`, and update their values as follows:
  - `nums[u] = nums[u] XOR k`
  - `nums[v] = nums[v] XOR k`

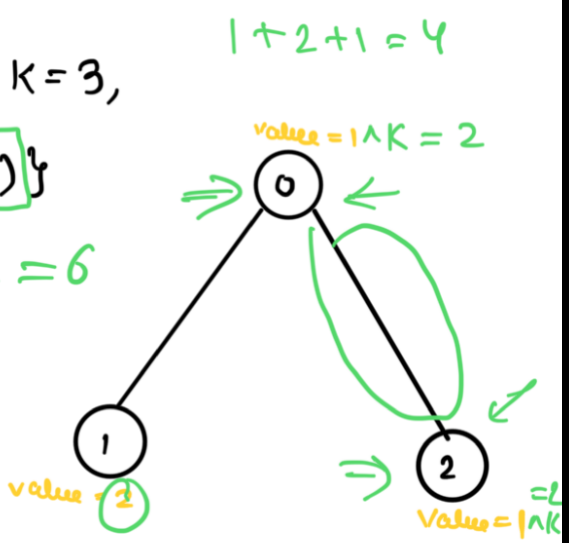
Return *the **maximum** possible **sum** of the **values** Alice can achieve by performing the operation **any** number of times*.

Example:- nums = {1, 2, 1}, k = 3,

edges = {(0,1), (0,2)}

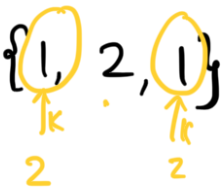
2 + 2 + 2 = 6

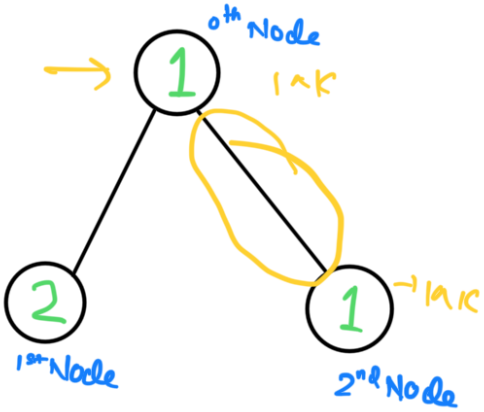
Output :- 6

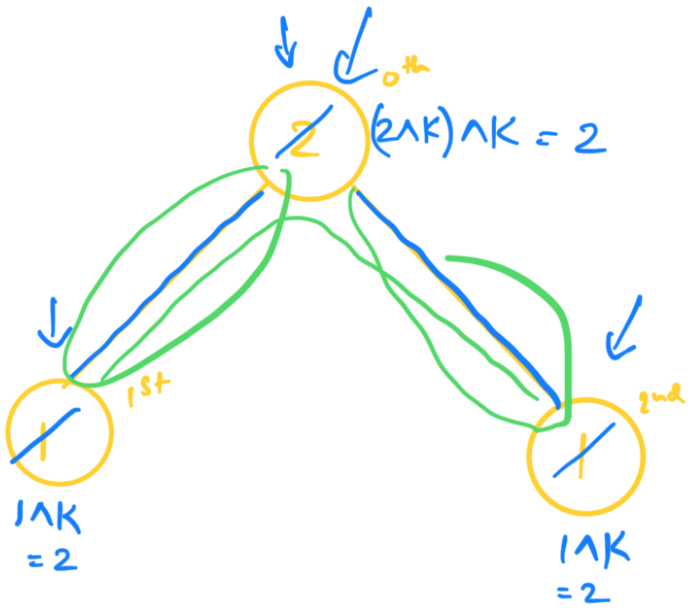


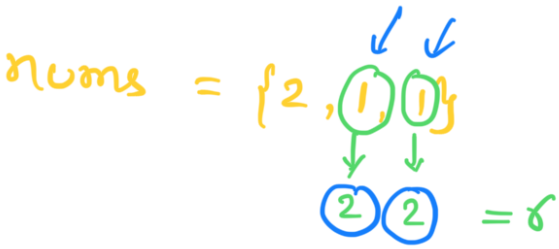
Thought Process

nums = {1, 2, 1} , K = 3

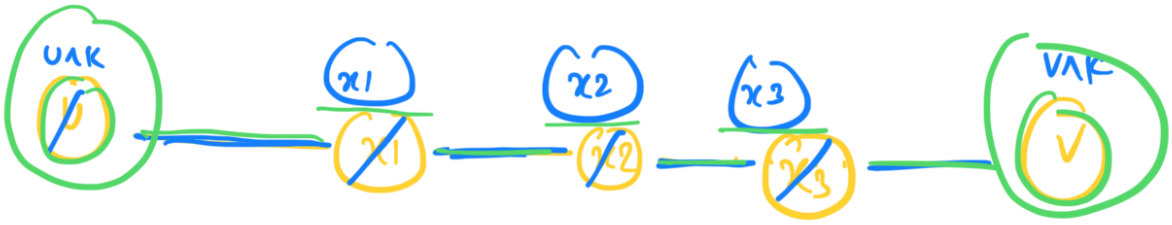








2+2+2 = 6



"We can pick any pair of nodes and apply XOR to them"

nums = {1, 2, 1} K = 3

0 1 2

1 → K → 2

1 → K → 2

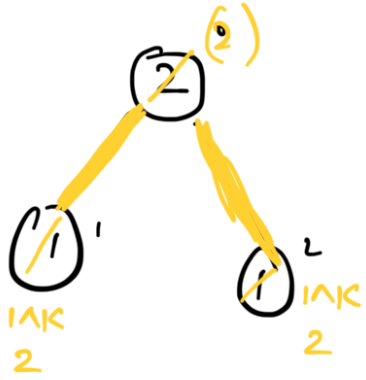
⇒ 2 + 2 + 2 = 6

nums = {2, 1, 1} = 2 + 2 + 2 = 6

0 1 2

2 → K → 2

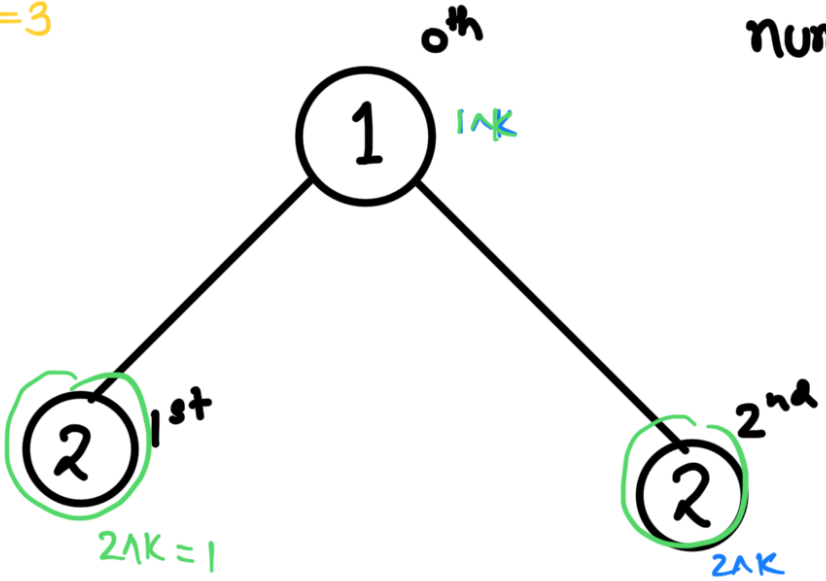
1 → K → 2



K = 3

nums = {1, 2, 2}

1 → K → 2



Count = 1 → odd

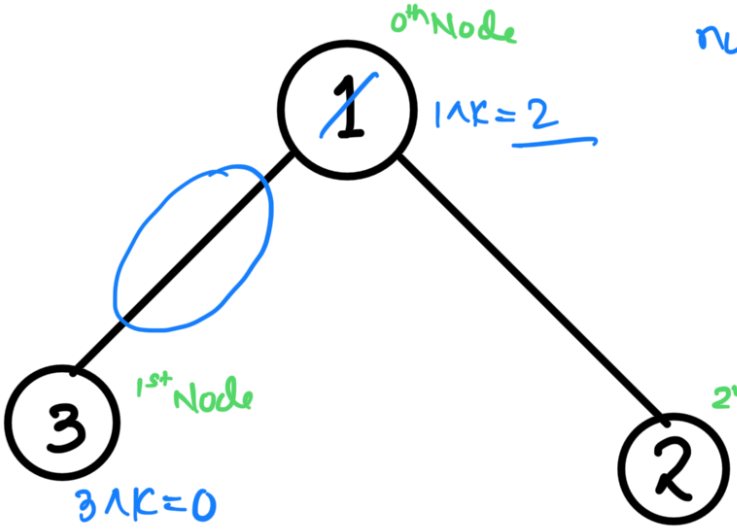
2 + 2 + 2 = 6 − 1 = 5

nuksan = (2 − 1) = 1

1 + 2 + 2 = 5

2 + 2 + 1 = 5

nuksan ↓ ↓



K = 3

nums = {1, 3, 2}

nums[0] = (3-0) = 3

nums[1] = 1

count = 1

Sum = 2 + 3 + 2 = 7

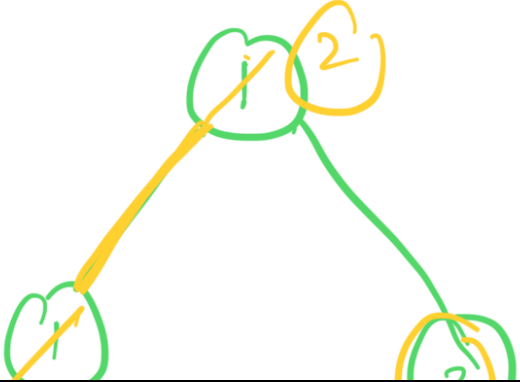
7 - 1 = 6

ideal Sum = 2 + 3 + 2 = 7

count = 1

(count → odd) = Sum - 1 = 6

even = sum



K = 1

nums = {1, 1, 2}

2 2

2

2

2 + 2 + 2 = Sum

= 6

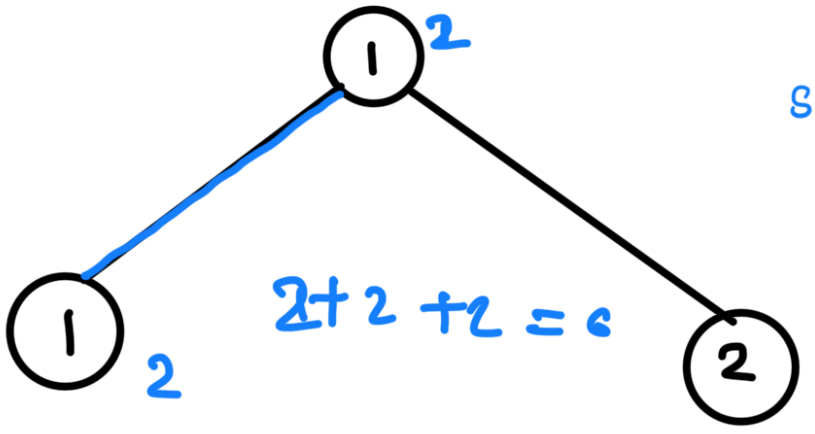
Greedy

T.C → O(n)

S.C = O(1).

Another Similar Approach.

K = 3



Sum = 1+1+2 = 4

+2

= 6

nums = { 1, 1, 2 }
↓k ↓k ↓k

new_nums = { 2, 2, 1 }

fayda = { 1, 1, -1 }

Benefit = 2

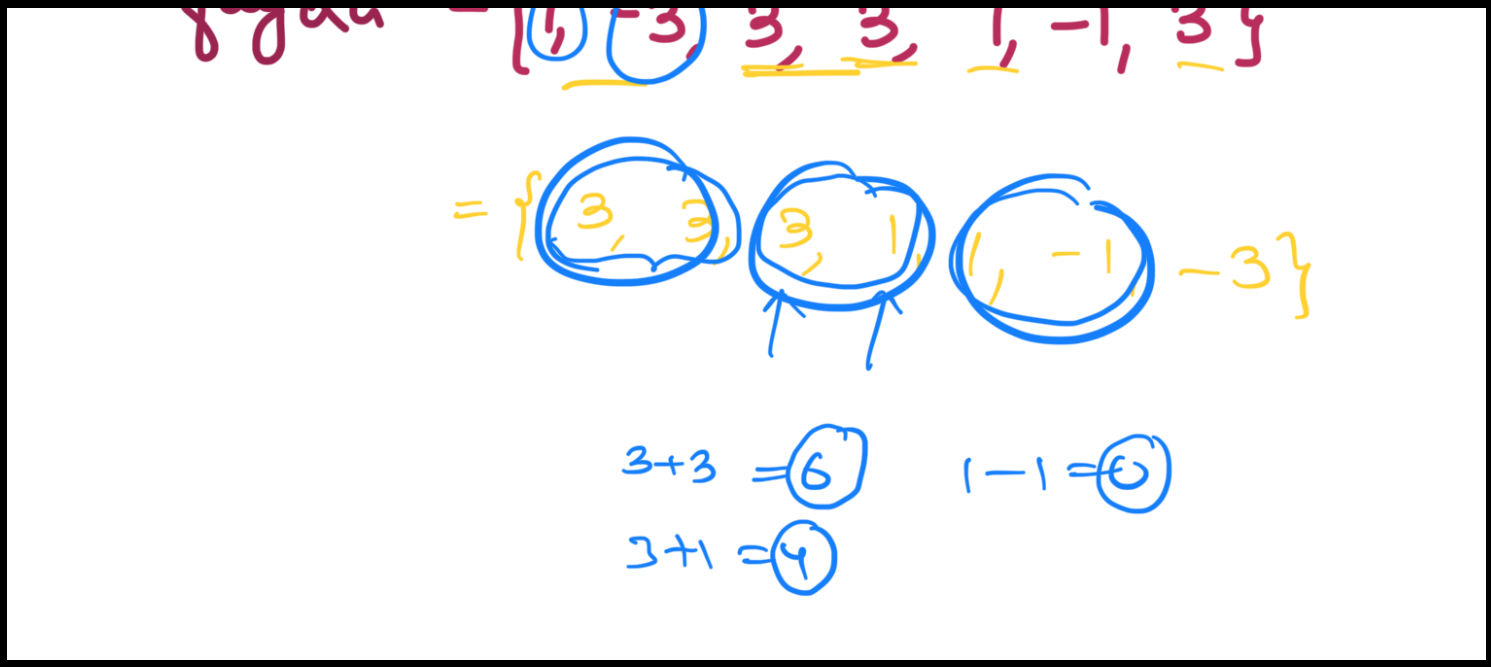
"This example is taken from leetcode"

nums = {1, 3, 4, 0, 1, 2, 0} , K = 3

Sum = 11 + 6 + 4 = 21

new_nums = {2, 0, 7, 3, 2, 1, 3}

fayda = {1, 2, ...}


3+3 = 6
3+1 = 4
1−1 = 0