Bit Difference

We define f (X, Y) as number of different corresponding bits in binary representation of X and Y. For example, f (2, 7) = 2, since binary representation of 2 and 7 are 010 and 111, respectively. The first and the third bit differ, so f (2, 7) = 2.

You are given an array **A** of **N** integers, A_1, A_2 ,…, A_N. Find sum of f(A_i, A_j) for all ordered pairs (i, j) such that $1 \leq i, j \leq N$. Return the answer modulo 10^9+7.

Example 1:

```
Input: N = 2
A = {2, 4}
Output: 4
Explaintion: We return
f(2, 2) + f(2, 4) +
f(4, 2) + f(4, 4) =
0 + 2 +
2 + 0 = 4.
```

Example 2:

```
Input: N = 3
A = {1, 3, 5}
Output: 8
Explaination: We return
f(1, 1) + f(1, 3) + f(1, 5) +
f(3, 1) + f(3, 3) + f(3, 5) +
f(5, 1) + f(5, 3) + f(5, 5) =
0 + 1 + 1 +
1 + 0 + 2 +
1 + 2 + 0 = 8.
```

Your Task:

You do not need to read input or print anything. Your task is to complete the function **countBits()** which takes the value N and the array A as input parameters and returns the desired count modulo 10^9+7.

Expected Time Complexity: $O(N * \log_2(Max(A_i)))$

Expected Auxiliary Space: O(1)

Constraints:

$1 \leq N \leq 10^5$

$2^0 \leq A[i] < 2^{31}$