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5844. Minimum Non-Zero Product of the Array Elements

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You are given a positive integer p. Consider an array nums (1-indexed) that consists of the integers in the **inclusive** range $[1, 2^p - 1]$ in their binary representations. You are allowed to do the following operation any number of times:

- Choose two elements x and y from nums.
- Choose a bit in x and swap it with its corresponding bit in y. Corresponding bit refers to the bit that is in the same position in the other integer.

For example, if x = 1101 and y = 0011, after swapping the 2^{nd} bit from the right, we have x = 1101 $11\underline{1}1$ and y = $00\underline{0}1$.

User Accepted:	0
User Tried:	0
Total Accepted:	0
Total Submissions:	0
Difficulty:	Medium

Find the **minimum non-zero** product of nums after performing the above operation **any** number of times. Return this product **modulo** $10^9 + 7$.

Note: The answer should be the minimum product before the modulo operation is done.

Example 1:

```
Input: p = 1
Output: 1
Explanation: nums = [1].
There is only one element, so the product equals that element.
```

Example 2:

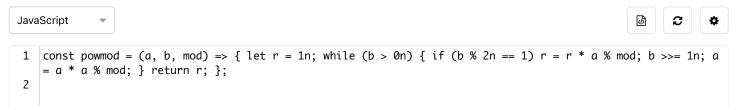
```
Input: p = 2
Output: 6
Explanation: nums = [01, 10, 11].
Any swap would either make the product 0 or stay the same.
Thus, the array product of 1 * 2 * 3 = 6 is already minimized.
```

Example 3:

```
Input: p = 3
Output: 1512
Explanation: nums = [001, 010, 011, 100, 101, 110, 111]
- In the first operation we can swap the leftmost bit of the second and fifth elements.
    - The resulting array is [001, <u>1</u>10, 011, 100, <u>0</u>01, 110, 111].
- In the second operation we can swap the middle bit of the third and fourth elements.
    - The resulting array is [001, 110, 001, 110, 001, 110, 111].
The array product is 1 * 6 * 1 * 6 * 1 * 6 * 7 = 1512, which is the minimum possible product.
```

Constraints:

• 1 <= p <= 60



United States (/region)

```
8/15/2021
                                               Minimum Non-Zero Product of the Array Elements - LeetCode Contest
     3 const ll = BigInt;
        const mod = ll(1e9 + 7);
    5 v const minNonZeroProduct = (p) ⇒ {
    6
             p = ll(p);
     7
             return (powmod((1n << p) - 2n, (1n << p - 1n) - 1n, mod) * ((1n << p) - 1n)) % mod;
     8
        };
  ☐ Custom Testcase
                         Use Example Testcases
                                                                                                                Run
                                                                                                                           △ Submit
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                                                                                  More Details ➤ (/submissions/detail/538741711/)
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```