5849. The Number of Good Subsets

My Submissions (/contest/biweekly-contest-60/problems/the-number-of-good-subsets/submissions/)

Back to Contest (/contest/biweekly-contest-60/)

You are given an integer array `nums`. We call a subset of `nums` **good** if its product can be represented as a product of one or more **distinct prime** numbers.

- For example, if `nums = [1, 2, 3, 4]`:
  - `[2, 3]`, `[1, 2, 3]`, and `[1, 3]` are **good** subsets with products `6 = 2*3`, `6 = 2*3`, and `3 = 3` respectively.
  - `[1, 4]` and `[4]` are not **good** subsets with products `4 = 2*2` and `4 = 2*2` respectively.

Return *the number of different **good** subsets in* `nums` ***modulo*** $10^9 + 7$.

A **subset** of `nums` is any array that can be obtained by deleting some (possibly none or all) elements from `nums`. Two subsets are different if and only if the chosen indices to delete are different.

User Accepted:	8
User Tried:	27
Total Accepted:	8
Total Submissions:	44
Difficulty:	Hard

Example 1:

```
Input: nums = [1,2,3,4]
Output: 6
Explanation: The good subsets are:
- [1,2]: product is 2, which is the product of distinct prime 2.
- [1,2,3]: product is 6, which is the product of distinct primes 2 and 3.
- [1,3]: product is 3, which is the product of distinct prime 3.
- [2]: product is 2, which is the product of distinct prime 2.
- [2,3]: product is 6, which is the product of distinct primes 2 and 3.
- [3]: product is 3, which is the product of distinct prime 3.
```

Example 2:

```
Input: nums = [4,2,3,15]
Output: 5
Explanation: The good subsets are:
- [2]: product is 2, which is the product of distinct prime 2.
- [2,3]: product is 6, which is the product of distinct primes 2 and 3.
- [2,15]: product is 30, which is the product of distinct primes 2, 3, and 5.
- [3]: product is 3, which is the product of distinct prime 3.
- [15]: product is 15, which is the product of distinct primes 3 and 5.
```

Constraints:

- `1 <= nums.length <= 10`^{5}
- `1 <= nums[i] <= 30`

JavaScript ▾

```
1  const ll = BigInt;
2  const mod = 1e9 + 7;
3  const numberOfGoodSubsets = (a) => {
4      let n = a.length;
5      let primes = [2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31];
6      let cnt = Array(31).fill(0);
7      for (const e of a) cnt[e]++;
```

```
 8        let ok = Array(31).fill(false);
 9        let sum = Array(31).fill(0);
10 ▾      for (let i = 1; i <= 30; i++) {
11            let x = i, j = 0;
12 ▾          for (const p of primes) {
13                let round = 0;
14 ▾              while (x % p == 0) {
15                    x /= p;
16                    round++;
17                }
18 ▾              if (round == 1) {
19                    sum[i] |= 1 << j;
20 ▾              } else if (round >= 2) {
21                    ok[i] = true;
22                    break;
23                }
24                j++;
25            }
26        }
27        let dp = Array(1 << 11).fill(0);
28        dp[0] = 1;
29 ▾      for (let i = 2; i <= 30; i++) {
30            if (ok[i]) continue;
31            let x = cnt[i];
32 ▾          for (let j = 0; j < 1 << 11; j++) {
33 ▾              if ((j & sum[i]) == 0) {
34                    dp[j | sum[i]] += dp[j] * x;
35                    dp[j | sum[i]] %= mod;
36                }
37            }
38        }
39        let res = 0;
40 ▾      for (let i = 1; i < 1 << 11; i++) {
41            res += dp[i];
42            if (res >= mod) res -= mod;
43        }
44        res = ll(res);
45        res *= powmod(2n, ll(cnt[1]), ll(mod));
46        return res % ll(mod);
47    };
48
49    const powmod = (a, b, mod) => { let r = 1n; while (b > 0n) { if (b % 2n == 1) r = r * a % mod; b >>= 1n; a
       = a * a % mod; } return r; };
```

☐ **Custom Testcase**   (Use Example Testcases)

Shortcut: Command + '
▼

● Run   ☁ Submit

Submission Result: Accepted (/submissions/detail/549444795/) ❓   (More Details ❯ (/submissions/detail/549444795/))

Share your acceptance!

Help Center (/support) | Jobs (/jobs) | Bug Bounty (/bugbounty) | Online Interview (/interview/) | Students (/student) | Terms (/terms) |

Privacy Policy (/privacy)

🇺🇸 United States (/region)