<sup>Day 4</sup> Problems(/problemset/all/)













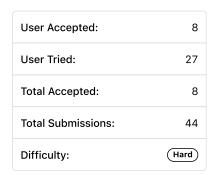
My Submissions (/contest/biweekly-contest-60/problems/the-number-of-good-subsets/submissions/)

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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]:
  - $\circ$  [2, 3], [1, 2, 3], and [1, 3] are **good** subsets with products 6 = 2\*3, 6 = 2\*32\*3, and 3 = 3 respectively.
  - o [1, 4] and [4] are not **good** subsets with products 4 = 2\*2 and 4 = 2\*2respectively.

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.

## 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<sup>5</sup>
- 1 <= nums[i] <= 30

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

```
8
          let ok = Array(31).fill(false);
  9
          let sum = Array(31).fill(0);
           for (let i = 1; i \le 30; i++) {
 10 ▼
 11
               let x = i, j = 0;
 12 ▼
               for (const p of primes) {
 13
                   let round = 0;
                   while (x \% p == 0) \{
 14 ▼
 15
                        x /= p;
 16
                        round++;
 17
                   if (round == 1) {
 18 ▼
                        sum[i] l= 1 \ll j;
 19
 20 •
                   } else if (round >= 2) {
                        ok[i] = true;
 21
 22
                        break;
 23
                   }
 24
                   j++;
 25
               }
 26
 27
          let dp = Array(1 << 11).fill(0);</pre>
 28
          dp[0] = 1;
 29 ▼
           for (let i = 2; i \le 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 \mid sum[i]] += dp[j] * x;
 35
                        dp[j \mid 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) \Rightarrow \{ let r = 1n; while <math>(b > 0n) \{ if (b \% 2n == 1) r = r * a \% mod; b >>= 1n; a \} \}
      = a * a % mod; } return r; };
☐ Custom Testcase
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                                                                              More Details > (/submissions/detail/549444795/)
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```

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