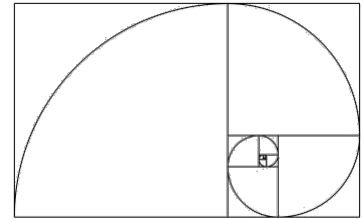


Problem F

Fibonacci Compression



Fibonacci compression is a new type of fault-tolerant compression based on Fibonacci numbers. Symbols are constructed according to the rule that no code word may have two consecutive “1” bits at any place other than the end, where they are mandatory. In practice this means that, for each compressed symbol bit-length i where $i \geq 2$, there are $Fibonacci(i - 1)$ compressed symbols of that length.

For example, the shortest 14 Fibonacci code words are as follows:

```
11      011      0011     1011
00011   10011   01011   000011
100011  010011  001011  101011
0000011 1000011 ...
```

Compressing a string using Fibonacci compression works by replacing the most frequent characters with the shortest codes. Given one such string s , find the length of each of its prefixes when compressed as small as possible according to this system.

Input

One line containing the length of the string to compress, n ($1 \leq n \leq 10^5$).

One line containing the string s as a sequence of n integers s_i ($0 \leq s_i \leq 10^6$).

Output

Output n lines, where the i th line is the compressed length of the first i characters of s , in bits.

Sample Input 1

4
97 97 98 98

Sample Output 1

2 4 7 10

Sample Input 2

24
175211757575757522345678910111210

Sample Output 2

259111316192123252731353944495460667278849195