
Compensated words

X46137_en

Consider a word s of length n , with only letters 'a' and 'b'. For any prefix p of s , let $a(p)$ be the number of 'a' within p , and let $b(p)$ be the number of 'b' within p . In this problem, we say that s is compensated if and only if for every of the $n + 1$ prefixes p of s we have $|a(p) - b(p)| \leq 2$.

For instance, "abbaaabb" is compensated, but "abbaaab" is not, because "abbaaaa" is a prefix with five 'a' and two 'b'. As other examples, neither "bbb" nor "bbbbbb" are compensated.

Given an n , print all compensated words of this length.

Input

Input consists of an n between 1 and 18.

Output

Print in alphabetical order all compensated words with n characters chosen between 'a' and 'b'.

Sample input 1

1

Sample output 1

a
b

Sample input 2

4

Sample output 2

aaba
aabb
abaa
abab
abba
abbb
baaa
baab
baba
babb
bbaa
bbab

Problem information

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