529 Addition Chains

An addition chain for n is an integer sequence $< a_0, a_1, a_2, \ldots, a_m >$ with the following four properties:

- $a_0 = 1$
- $a_m = n$
- $a_0 < a_1 < a_2 < \ldots < a_{m-1} < a_m$
- For each k ($1 \leq k \leq m$) there exist two (not neccessarily different) integers i and j ($0 \leq i, j \leq k-1$) with $a_k = a_i + a_j$

You are given an integer n. Your job is to construct an addition chain for n with minimal length. If there is more than one such sequence, any one is acceptable.

For example, $< 1, 2, 3, 5 >$ and $< 1, 2, 4, 5 >$ are both valid solutions when you are asked for an addition chain for 5.

Input Specification

The input file will contain one or more test cases. Each test case consists of one line containing one integer n ($1 \leq n \leq 100$). Input is terminated by a value of zero (0) for n.

Output Specification

For each test case, print one line containing the required integer sequence. Separate the numbers by one blank.

Hint: The problem is a little time-critical, so use proper break conditions where necessary to reduce the search space.

Sample Input

```
5
7
12
15
77
0
```

Sample Output

```
1 2 4 5
1 2 4 6 7
1 2 4 8 12
1 2 4 5 10 15
1 2 4 8 9 17 34 68 77
```