Addition Chains

Time Limit: 1000MS **Memory Limit:** 65536K
Total Submissions: 5277 **Accepted:** 2834 **Special Judge**

Description

An addition chain for n is an integer sequence with the following four properties:

- a0 = 1
- am = n
- a0 < a1 < a2 < ... < a_{m-1} < am
- For each k (1<=k<=m) there exist two (not necessarily different) integers i and j (0<=i, j<=k-1) with ak=ai+aj

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

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