3715 Chimes

In the monastery of Hotoshopp, the monks perform a mysterious ritual every midnight. The exact details of this centuries-old ritual is secret, but it is known that at the beginning of the ritual (exactly at midnight) several chimes are sounded at the same time. There are many chimes in the monastery, but there are only n different types of chimes. Every chime produces a perfect triangle wave (see below for details) and chimes of the same type produce exactly the same sound. A Type 1 chime produces a sound of frequency 10Hz and the frequency of a Type i chime is double the frequency of a Type $i-1$ chime.

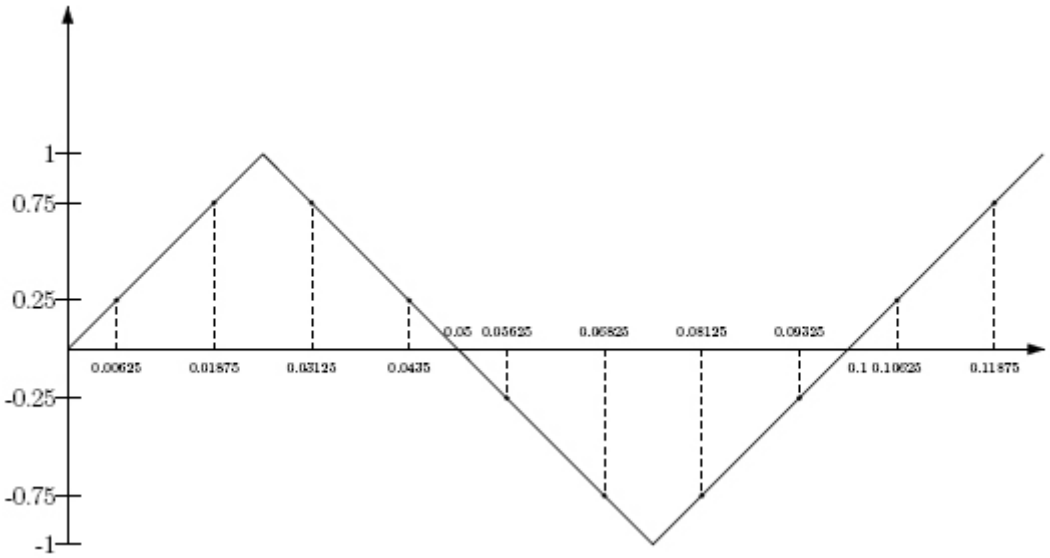
Usually not all the chimes are sounded during the ritual; there are very strict rules that determine which combination of chimes are sounded at midnight on a given day. Your task is to write a program that, given a digital recording of the sound, determines which chimes were used.

The input contains m sound samples which describe the sound, starting at midnight. The sampling rate is exactly twice the frequency of the chime with the highest frequency. For example, if there are $n = 4$ chimes, then the Type 4 chimes have frequency 80Hz, thus there are 160 samples per second. If the sampling frequency is f, then the i-th sample is taken

$$t(i) := \frac{i}{f} - \frac{12}{f}$$

seconds after midnight ($i = 1, 2, \ldots, m$). That is, the samples are taken once every $1/f$ seconds, and the first sample is taken $1/(2f)$ seconds after midnight.

Each chime produces a sound wave that is a perfect triangle wave. The wave oscillates between 1 and -1 in each period. At midnight, the value of the sound wave is 0, and it is increasing. The sound of the chime will not change during the recording: it does not stop, it does not get quieter or louder. As an example, the figure below shows the triangle wave of a Type 1 chime. If the sampling rate is 80Hz, thenthe dashed vertical lines show the time points when a sample is taken.



The following table shows the values of the first 10 samples:

Sample number	Sample time	Sample value
1	0.00625	0.25
2	0.01875	0.75
3	0.03125	0.75
4	0.0435	0.25
5	0.05625	-0.25
6	0.06825	-0.75
7	0.08125	-0.75
8	0.09325	-0.25
9	0.10625	0.25
10	0.11875	0.75

If two chimes are sounded at the same time, then the two sound waves are simply added together; each sound sample is the sum of the corresponding two sound samples.

Input

The input contains several blocks of test cases. Each test case begins with a line containing an integer $1 \leq n \leq 10$, the number of chimes, and an integer $1 \leq m \leq 100000$, the number of sound samples. The number of samples is always a power of 2, and it is sufficiently large such that the input contains at least one full period from the sound of each chime. The next m lines contain the m sound samples: each line contains a real number.

The input is terminated by a block with $n = m = 0$.

Output

For each test case, your program should output n lines, each line containing a single integer. The integer in the i-th line should be the number Type i chimes that were sounded. It can be assumed that there are at most 1000 chimes of each type.

Sample Input

```
4 32
13.5
30.5
39
27
18.5
-6.5
-11
-7
7
11
6.5
-18.5
-27
-39
-30.5
-13.5
13.5
30.5
39
```

```
27
18.5
-6.5
-11
-7
7
11
6.5
-18.5
-27
-39
-30.5
-13.5
0 0
```

Sample Output

```
26
29
2
2
```