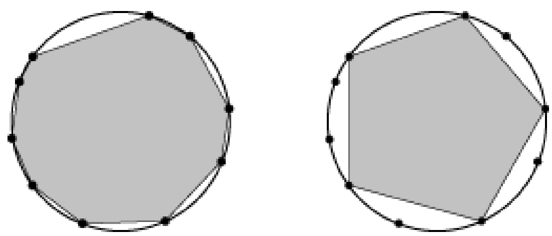
4220 - Shrinking Polygons

Latin America - South America - 2008/2009

A polygon is said to be *inscribed* in a circle when all its vertices lie on that circle. In this problem you will be given a polygon inscribed in a circle, and you must determine the minimum number of vertices that should be removed to transform the given polygon into a *regular polygon*, i.e., a polygon that is equiangular (all angles are congruent) and equilateral (all edges have the same length).

When you remove a vertex v from a polygon you first remove the vertex and the edges connecting it to its adjacent vertices w_1 and w_2, and then create a new edge connecting w_1 and w_2. Figure (a) below illustrates a polygon inscribed in a circle, with ten vertices, and figure (b) shows a pentagon (regular polygon with five edges) formed by removing five vertices from the polygon in (a).


(a) (b)

In this problem, we consider that any polygon must have at least three edges.

Input

The input contains several test cases. The first line of a test case contains one integer N indicating the number of vertices of the inscribed polygon ($3 \le N \le 10^4$). The second line contains N integers X_i separated by single spaces ($1 \le X_i \le 10^3$, for $0 \le i \le N - 1$). Each X_i represents the length of the arc defined in the inscribing circle, clockwise, by vertex i and vertex $(i+1) \bmod N$. Remember that an *arc* is a segment of the circumference of a circle; do not mistake it for a *chord*, which is a line segment whose endpoints both lie on a circle.

The end of input is indicated by a line containing only one zero.

Output

For each test case in the input, your program must print a single line, containing the minimum number of vertices that must be removed from the given polygon to form a regular polygon. If it is not possible to form a regular polygon, the line must contain only the value `-1`.

Sample input	**Output for the sample input**
3 1000 1000 1000 6 1 2 3 1 2 3 3 1 1 2 10 10 40 20 30 30 10 10 50 24 26	0 2 -1 5

0	

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