## 6238 Necklace Checking

You have been employed by a necklace manufacturer to check designs for necklaces. Their necklaces are circular chains of circular links. [By "circular chain" we don't require that the necklace can be laid out in a perfect circle, just that the links form a cycle (closed loop) with no extra links that hang off of the cycle or connect links that are already connected.] The necklaces are depicted by a design in the form of a collection of the centers and radii of the links. The question is whether or not the given collection of links is connected in a circle. The links have some thickness and the designers use the outer radius to describe a link. The manufacturing process is such that the outer radius can be made to exact specification, but the inner radius cannot. Links are no more than $1 / 8$ inch thick, so two links that overlap by at least $1 / 4$ inch are connected. To avoid manufacturing problems, designers will never give you a data set that includes two links that overlap by between $1 / 8$ and $3 / 8$ of an inch. Thus, if you check for greater or less than $1 / 4$ inch overlap, you will be fine.

There will be at most 100 links for each data set. At least 3 links are needed to lay out a circle.

## Input

Input is a collection of designs. Each design will be given as list of links. Each link will be given as three real numbers: the $x$ and $y$ coordinates of the center and the radius of the link. You may assume that all these values are positive. The end of a design will be indicated by ' 000 '. After the last design will be a line with three ' -1 's.

## Output

Print the case number followed by 'valid' or 'invalid' indicating whether or not the given links join together to form a circular necklace. Follow the given format exactly, 'Case', a single space, the case number, a colon, a single space, and the word 'valid' or 'invalid' with no trailing space.

## Sample Input

$10 \quad 20 \quad 12$
20112
$40 \quad 3012$
$50 \quad 2012$
40112
$20 \quad 3012$
000
25105
101012
10255
$25 \quad 2512$
252512
000
-1 -1 -1

## Sample Output

Case 1: valid
Case 2: invalid

