2026/2027 SOUTHERN CALIFORNIA REGIONAL INTERNATIONAL COLLEGIATE PROGRAMMING CONTEST

Problem 11
Sticker Scraping

You and your friend are sitting at a table with a triangle-shaped sticker in the middle. You have sticker scrapers, and you are taking turns scraping up the sticker. Because you are already sitting, you only can only scrape from a fixed direction, and you can only scrape a limited amount of the sticker at a time, as described below. You and your friend really like scraping, so now you wonder: what is the maximum number of times you can scrape the sticker until it is gone?

For this problem, we will consider the scrapers to be infinite lines that are swept partway across the plane, intersecting part of the sticker. When scraping, you do the following process:

1. Move your scraper forward until it intersects a vertex of the un-scraped portion of the sticker.
2. Continue moving your scraper forward a nonzero distance until it touches another vertex of the unscraped portion of the sticker.
3. Remove the portion of the sticker that your scraper passed through, leaving behind any unscraped portion of the sticker.

You and your friend may scrape the sticker in any order.

Given the coordinates of the triangle and the directions of your scrapers, compute the maximum number of times you and your friend can scrape the sticker, or if you can continue scraping the sticker forever.

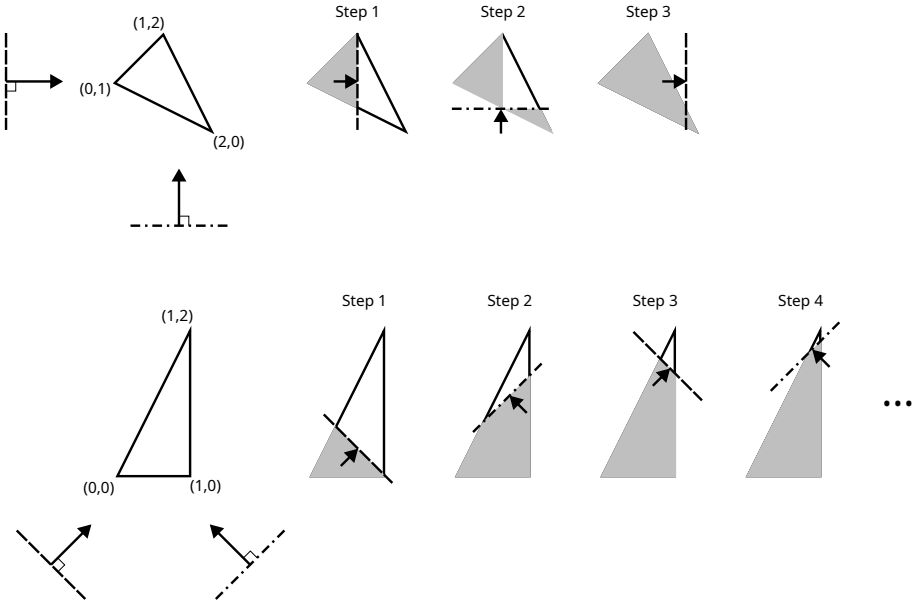


Figure 1. Sticker scraping diagrams corresponding to the Sample Input.

In Figure 1 above, the top sticker can be scraped 3 times. The bottom sticker can be scraped infinitely many times.

The first line of input is an integer N, the number of test cases: $1 \leq N \leq 1000$. The next N lines contain the test cases. On each line, there are ten space-separated integers x_1, y_1, x_2, y_2, x_3, y_3, dx_1, dy_1, dx_2, and dy_2.

Each pair (x_i, y_i) denotes the (x, y) coordinates of the ith sticker vertex: $|x_i| \leq 100$, $|y_i| \leq 100$. The sticker is guaranteed to have a non-zero area.

Problem 11
Sticker Scraping (continued)

Each pair (dx_i, dy_i) denotes the scraping direction of the ith scraper. When scraping, the scraper starts far away from the triangle and is translated along the direction (dx_i, dy_i): $|dx_i| \leq 100$, $|dy_i| \leq 100$. It is guaranteed that dx_i and dy_i are not both zero.

Print N lines, the answer to each test case in order. For each test case, print the maximum number of times you can scrape the sticker, or the string "`forever`" if you can continue scraping forever.

Sample Input

```
2
0 1 1 2 2 0 1 0 0 1
0 0 1 2 1 0 1 1 -1 1
```

Output for the Sample Input

```
3
forever
```