Family Pictures

While visiting her childhood home, Lea found a box of old family pictures in the attic. Looking at some pictures, she notices that she seemed to grow up quite quickly. But how quickly exactly? For a thorough scientific analysis, Lea therefore wants wants to measure her body height by looking at the pictures from different years.

Unfortunately, many of the old pictures were still taken using reversal film and are stored on diapositives, small slides the size of about $5 \times 5\,\mathrm{cm}^2$. It's hard to measure her size from such a small image. So Lea took her family's old slide projector and projected the images on a large wall.

Scaling the pictures up worked well — however the lens of the projector, which hasn't been used in decades, had several defects. The projected images are quite distorted: they are skewed, shifted, tilted, or even rotated! Especially, ratios of length and parallel lines are not preserved in general. Of course, this makes it hard to measure lengths. However, Lea notices that at least, lines are preserved, i.e. any three points that were on the same line in the image are also on the same line in the projection.

Lea is sure that by having the coordinates of certain points on the wall, she can recover the length information in the original image. She proceeds to measure the four corner points of the originally square image on the wall. Additionally, she measures the point at the top of her head, and the center point of a clock on the wall she was standing next to, which she knows was always at the height of exactly $1\,\mathrm{m}$.

Given these six points, can you tell Lea how large she is in the picture?

Input

The first line of the input contains an integer t. t test cases follow.

Each test case consists of a single line containing twelve decimal numbers a_x a_y b_x b_y c_x c_y d_x d_y e_x e_y f_x f_y, where

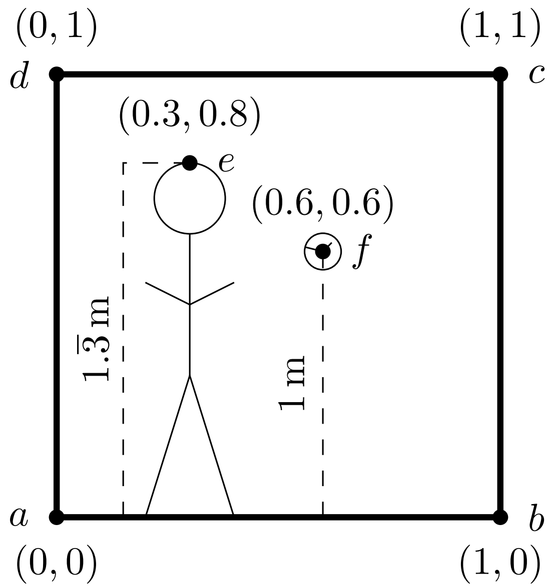
- the point (a_x, a_y) is the projection of the lower-left corner at $(0, 0)$ in the original image,
- the point (b_x, b_y) is the projection of the lower-right corner at $(1, 0)$ in the original image,
- the point (c_x, c_y) is the projection of the upper-right corner at $(1, 1)$ in the original image,
- the point (d_x, d_y) is the projection of the upper-left corner at $(0, 1)$ in the original image,
- the point (e_x, e_y) is the projection of the point at the top of Leas head,
- the point (f_x, f_y) is the projection of the center of the wall clock at the height of $1\,\mathrm{m}$.

Output

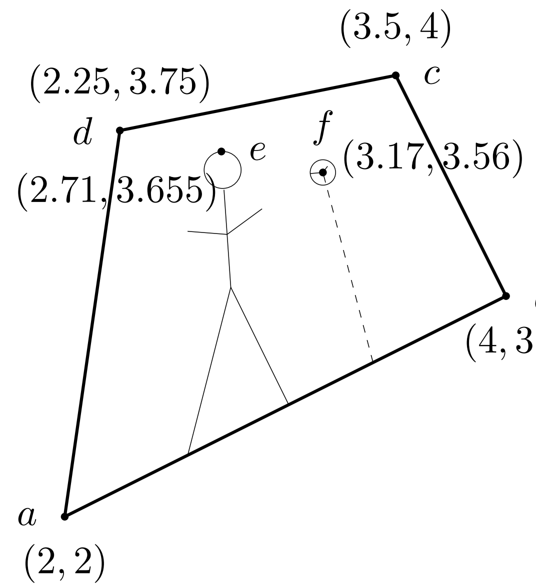
For each test case, output one line containing "Case #i: x" where i is its number, starting at 1, and x is the height of Lea in the original picture frame in meters, with an absolute error of up to 10^{-4}.

Constraints

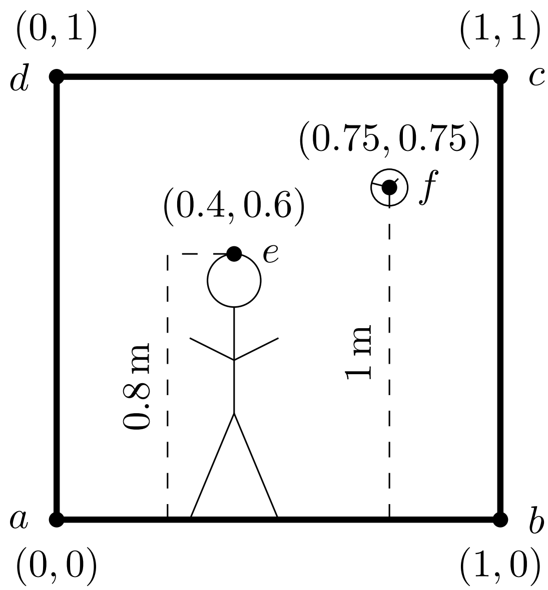
- $1 \leq t \leq 20$
- $0.0 \leq a_x, a_y, b_x, b_y, c_x, c_y, d_x, d_y, e_x, e_y, f_x, f_y \leq 10.0$
- No three of the four points $(a_x, a_y), (b_x, b_y), (c_x, c_y), (d_x, d_y)$ are collinear.
- The quadrilateral $(a_x, a_y), (b_x, b_y), (c_x, c_y), (d_x, d_y)$ is convex.
- The points (e_x, e_y) and (f_x, f_y) are strictly on the inside of the quadrilateral $(a_x, a_y), (b_x, b_y), (c_x, c_y), (d_x, d_y)$.



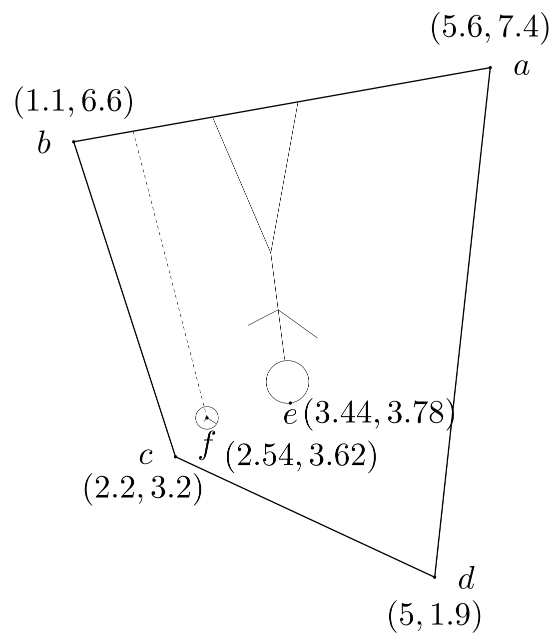
Case #1: Original image.



Case #1: Projected image.



Case #2: Original image.



Case #2: Projected image.

Figure 1: Illustration of the first sample input. The input are the coordinates in the projected image on the right. The output is the height of Lea in the original image on the left.

Sample Input 1	Sample Output 1

`2`
`2 2 4 3 3.5 4 2.25 3.75 2.71 3.655 3.17 3.56`
`5.6 7.4 1.1 6.6 2.2 3.2 5 1.9 3.44 3.78 2.54 3.62`
	`Case #1: 1.333333333`
	`Case #2: 0.8`

Sample Input 2

```
10
3.77 8.02 1.35 5.02 6.37 4.14 5.70 6.38 4.55 6.23 3.75 6.83
7.70 6.97 3.23 6.52 2.31 2.51 7.63 2.10 5.34 5.34 3.48 3.52
2.65 8.48 3.46 4.91 9.28 7.79 9.17 9.95 5.67 7.28 9.18 7.96
1.52 4.46 2.54 1.77 8.22 6.64 0.62 9.15 2.02 7.90 4.51 4.03
5.48 4.46 7.32 7.53 1.77 7.58 1.85 0.49 6.16 5.71 5.27 5.92
8.41 3.86 8.23 6.78 0.35 2.06 6.34 2.69 5.51 5.15 5.26 4.36
8.50 6.35 2.48 8.13 1.16 3.98 2.24 0.91 5.78 5.53 4.04 5.67
0.34 6.15 9.26 7.22 9.21 9.76 3.78 8.18 9.06 7.81 1.06 6.45
4.73 9.87 5.02 2.72 9.61 3.74 9.34 9.60 6.46 7.08 7.82 7.59
7.70 1.01 7.64 5.59 2.28 5.72 5.66 1.88 6.45 3.38 6.94 4.20
```

Sample Output 2

```
Case #1: 2.717823095
Case #2: 0.466630744
Case #3: 0.2961857833
Case #4: 1.070240563
Case #5: 0.142460224
Case #6: 0.7522650777
Case #7: 0.5915934551
Case #8: 1.368807465
Case #9: 0.5080808653
Case #10: 2.288161243
```