Problem K. Rotation Transformation

Input file:	rotate-this.in
Output file:	rotate-this.out
Time limit:	2 seconds
Memory limit:	256 mebibytes

A simple motion over and over...

t.A.T.u., "A Simple Motion"

Julia loves simple motions very much, especially in three-dimensional space! Recently, she found a matrix that corresponds to some rotation around an axis that goes through the origin.

A rotation matrix A moves point $\begin{pmatrix} x \\ y \\ z \end{pmatrix}$ to $\begin{pmatrix} x' \\ y' \\ z' \end{pmatrix}$ like this:

$$\begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \begin{pmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{pmatrix} \times \begin{pmatrix} x \\ y \\ z \end{pmatrix}.$$

A rotation can also be described geometrically by a unit (that is, of length 1) vector $v = \begin{pmatrix} v_x \\ v_y \\ v_z \end{pmatrix}$ around which the rotation takes place, and a rotation angle α. Suppose you look at the origin from the end of v. Then, if rotation is going counter-clockwise, angle α will be positive, otherwise, it will be negative.

Julia wants to express the rotation given by a matrix geometrically. Unfortunately, Julia does not know the values of v and α, therefore, she asked you to find them, so that she could continue her simple motion.

Input

You are given the matrix A: three lines with three **real** numbers on each. Each number is given with at most 20 digits after the decimal point. It is guaranteed that there exist such v and α that $1 \le |\alpha| \le 179$, and additionally, the elements of matrix A' which corresponds to a rotation around vector v by angle α differ from the corresponding elements of A by at most 10^{-13}.

Output

On the first line, print the angle α in degrees. On the second line, print coordinates of the unit vector v. Output all numbers as precisely as possible. Your answer will be considered correct if the difference between A_{ij} and the matrix constructed from your angle and unit vector will not exceed 10^{-6}.

Example

rotate-this.in	rotate-this.out
0 -1 0 1 0 0 0 0 1	90 0 0 1