

Rolling Odds

Computer Science Society
Programming Contest
Spring 2011

Suppose we play a dice game in which three dice are rolled in succession, one at a time. After three rolls, one of the following *outcomes* has occurred:

- *one of a kind*—no two dice have the same face value.
- *two of a kind*—two, but not all three, of the dice have the same face value.
- *three of a kind*—all three dice have the same face value.

In this problem, we compute the probability of each outcome after 0 rolls, 1 roll, 2 rolls, and 3 rolls. For example, after two rolls that have the same face value, there is zero probability that the outcome will be *one of a kind*. After two rolls that don't have the same face value, there is zero probability that the outcome will be *three of a kind*. After 3 rolls, only one outcome has nonzero probability... the outcome that occurred.

Input Format

A *face value* is a number in $\{1, 2, 3, 4, 5, 6\}$. Each line of input contains three face values, separated by blanks. The face values represent successive rolls in a dice game.

Output Format

For each line of input, compute that probability of each outcome—*one of a kind*, *two of a kind*, *three of a kind*—after 0 rolls, 1 roll, 2 rolls, and 3 rolls. Express each probability as a rational number in reduced form, as shown in the output sample. Note that 0 is expressed as 0/1.

Input and Output Sample

see reverse side of this page

Input Sample

3 6 2
2 2 2
1 5 5
1 1 3
4 2 4

Output Sample

5/9 5/12 1/36
5/9 5/12 1/36
2/3 1/3 0/1
1/1 0/1 0/1

5/9 5/12 1/36
5/9 5/12 1/36
0/1 5/6 1/6
0/1 0/1 1/1

5/9 5/12 1/36
5/9 5/12 1/36
2/3 1/3 0/1
0/1 1/1 0/1

5/9 5/12 1/36
5/9 5/12 1/36
0/1 5/6 1/6
0/1 1/1 0/1

5/9 5/12 1/36
5/9 5/12 1/36
2/3 1/3 0/1
0/1 1/1 0/1