UVa Online Judge

# 11605 Lights inside a 3D Grid

You are given a 3D grid, which have dimensions $N$, $M$ and $P$. Each of the $M \times N \times P$ cells has a light. Initially all lights are off. You will have $K$ turns. In each of the $K$ turns,

- You will select a cell A randomly from the grid
- You will select a cell B randomly from the grid
- Toggle the states of all the bulbs bounded by cell A and cell B, ie make all the ON lights OFF and make all the OFF lights ON which are bounded by A and B. To be more clear, consider cell A is $(x_1, y_1, z_1)$ and cell B is $(x_2, y_2, z_2)$. Then you have to toggle all the bulbs in grid cell $(x, y, z)$ where $\min(x_1, x_2) \leq x \leq \max(x_1, x_2)$, $\min(y_1, y_2) \leq y \leq \max(y_1, y_2)$ and $\min(z_1, z_2) \leq z \leq \max(z_1, z_2)$.

How many bulbs are expected to be ON after $K$ turns?

**Note:** A and B can be the same cell.

## Input

First line of the input is an integer $T$ ($T < 101$) which denotes the number of test cases. Each of the next $T$ lines represents one test case by 4 integers $N$, $M$, $P$ ($0 < M, N, P < 101$) and $K$ ($0 \leq K \leq 10000$) separated by spaces.

## Output

Output one line for each test cases giving the expected number of ON lights. Up to 1E-6 error in your output will be acceptable. Print the case number followed by the output. Look at the sample output for exact format.

## Sample Input

```
2
2 3 4 1
2 3 4 2
```

## Sample Output

```
Case 1: 6.3750000000
Case 2: 9.0976562500
```