Random Integers Random Bits

Given an integer range [A,B],

1. What's the probability to get a 1-bit if we first randomly choose a number x in the range and then randomly choose a bit from x?

2. What's the expected number of bit 1s if we randomly choose a number x in the range?

Input Format

The first line of input is the number of test cases T
Each test cases is a line contains 2 integers A and B separated by a space.

Output Format

For each test case output a line containing 2 float numbers separated by a space. The first one is the probability and the second one is the expected number. You should output the number accurate to 5 fractional digits.

Constraints

$1 \leq T \leq 200$
$1 \leq A \leq B \leq 10^{10}$

Sample Input

```
1
2 4
```

Sample Output

```
0.61111 1.33333
```

Explanation

(10) (11) (100)

(1) So we got a one in $\frac{1}{3} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{1} + \frac{1}{3} \times \frac{1}{3} = \frac{11}{18}$

(2) The expected 1 we have is : $1 \times \frac{1}{3} + 2 \times \frac{1}{3} + 1 \times \frac{1}{3} = \frac{4}{3}$