

# Random Integers Random Bits



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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

```
0.611111 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 :  $1 \times \frac{1}{3} + 2 \times \frac{1}{3} + 1 \times \frac{1}{3} = \frac{4}{3}$