

Problem 4: The One Dollar Gambler

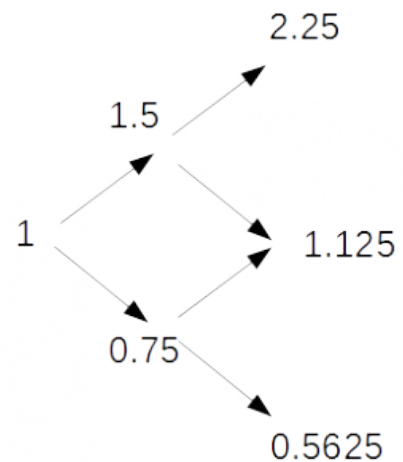
Input file: Problem4.txt

Starting with one dollar of capital, a gambler chooses a fixed proportion, F , of his capital to bet on a fair coin toss repeatedly for T tosses.

His return is double his bet for heads and he loses his bet for tails.

For example, if $F=1/4$, for the first toss he bets 0.25\$, and if heads comes up he wins 0.5\$ and so then have 1.5\$. He then bets 0.375\$ and if the second toss is tails, he has 1.125\$ left.

The diagram on the right shows the possibilities in two coin tosses. If both times head comes, his worth is 2.25\$, if one head and one tail comes in either order, his worth is 1.125\$, and in case it is tails both times, he is left with 0.5625\$. All four cases are equally probable. The expected worth of the one dollar gambler is therefore 1.265625 after a two toss game.



Your task in this problem is to find the expected worth of the one dollar gambler given F , the fraction of current worth to bet on the next toss and T , the total number of coin tosses.

Input

The input consists of multiple test cases. The first line of input is the number of test cases N ($1 \leq N \leq 100$). Each of the following N lines contains a float point number F ($0 \leq F \leq 1$), the fraction of current worth to bet and T ($1 \leq T \leq 100$), the number of coin tosses.

Output

For each test case, print a single line saying "Case #n:" where n is the test case number followed by a space followed by the expected worth of the one dollar gambler. Small rounding errors are acceptable in the output.

Sample Input

```
2
0.25 1
0.25 2
0.2 100
```

Sample Output

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Case #1: 1.125
Case #2: 1.26562
Case #3: 13780.6
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