

Ping Pong Probability

Two Ping Pong players agree to play several games. The players are evenly matched. However, the person serving first has a probability p of winning that game. A serves the first game and thereafter the loser serves first. What is the Probability that A wins the n th game?

Input

Number of test cases T followed by T lines of ' n ' - the number of games played; and ' p ' probability of person serving first winning.

$0 < T < 100$

Output

Print for each test case the probability of A winning.

Please print a *double* value.

Example

Input:

2

4 0.7

7 0.7

Output:

0.4872

0.500819