

Counting Rabbits

Rabbits are incredible animals. One of their more interesting characteristics is related with their reproduction. If we keep a couple of adult rabbits in optimal conditions of life, it is scientifically proved that, each month, that couple is capable of procreating a new couple of young rabbits. You should know that only the adult couples may procreate and that the time taken by a young couple of rabbits to grow (that is, to become adult) is of 1 month. For the convenience of this task, we will be dealing with immortal rabbits.

Farmer Luis (FL) is a great admirer of rabbits. FL bought in the market 1 couple of adult rabbits (alive, of course) and now wants to raise as many rabbits as he can. Unfortunately, there is a little problem, FL has boxes where he can only put exactly 2^M ($1 \leq M \leq 20$) couples of rabbits (neither more nor less). FL can use as many boxes as he wishes as long as he fulfils the condition above. FL would like to know how many couples of rabbits he will not be able to put inside boxes if he raises rabbits for N ($1 \leq N \leq 2147483647$) months and then tries to 'box' them (put them inside boxes). You should help FL with these calculations. You must consider that FL starts with 1 adult couple of rabbits the 1st month, and that couples of rabbits reproduce and grow as stated in the 1st paragraph.

Input

Line 1: C ($1 \leq C \leq 100$), the number of calculations your program will be requested to do

Lines 2- $C+1$: two integers N and M (in that order)

Output

Lines 1- C : on each line print S , which is the number of un-'boxed' couples of rabbits.

Example

Input:

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1
5 2
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Output:

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0
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Output explanation

After growing couples of rabbits during 5 months, FL has 5 adult couples and 3 young couples (8 couples in total). FL has boxes where he can put $2^2 = 4$ couples of rabbits, so he can use 2 boxes to 'box' all the 8 couples. If FL had instead grown couples of rabbits for 4 months, he would have 5 couples in total; thus 1 couple would have remained un-'boxed' (the answer would have been 1).