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Recursion: Davis' Staircase

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Check out the resources on the page's right side to learn more about recursion and memoization. The video tutorial is by Gayle Laakmann McDowell, author of the best-selling interview book [Cracking the Coding Interview](#).

Davis has s staircases in his house and he likes to climb each staircase **1**, **2**, or **3** steps at a time. Being a very precocious child, he wonders how many ways there are to reach the top of the staircase.

Given the respective heights for each of the s staircases in his house, find and print the number of ways he can climb each staircase on a new line.

Input Format

The first line contains a single integer, s , denoting the number of staircases in his house.

Each line i of the s subsequent lines contains a single integer, n , denoting the height of staircase i .

Constraints

- $1 \leq s \leq 5$
- $1 \leq n \leq 36$

Subtasks

- $1 \leq n \leq 20$ for 50% of the maximum score.

Output Format

For each staircase, print the number of ways Davis can climb it in a new line.

Sample Input

```
3
1
3
7
```

Sample Output

```
1
4
44
```

Explanation

Let's calculate the number of ways of climbing the first two of the Davis' $s = 3$ staircases:

- The first staircase only has $n = 1$ step, so there is only one way for him to climb it (i.e., by jumping **1** step). Thus, we print **1** on a new line.
- The second staircase has $n = 3$ steps and he can climb it in any of the four following ways:
 - $1 \rightarrow 1 \rightarrow 1$
 - $1 \rightarrow 2$
 - $2 \rightarrow 1$
 - 3**

Thus, we print **4** on a new line.



Submissions: 4147

Submissions: 414 /

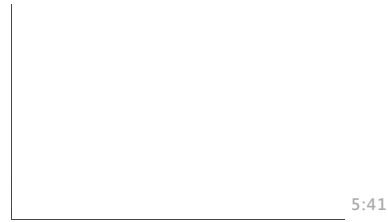
Max Score: 30

Difficulty: Medium



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C#



```
1 using System;
2 using System.Collections.Generic;
3 using System.IO;
4 using System.Linq;
5 class Solution {
6
7     static int ContarFormas(int n)
8     {
9         List<int> formas = new List<int>();
10        formas.Add(1);
11        formas.Add(2);
12        formas.Add(4);
13
14        for (int i = 3; i < n; i++)
15        {
16            formas.Add(formas[i - 1] + formas[i - 2] + formas[i - 3]);
17        }
18        return formas[n-1];
19    }
20
21    static void Main(String[] args)
22    {
23        int s = Convert.ToInt32(Console.ReadLine());
24        for (int a0 = 0; a0 < s; a0++)
25        {
26            int n = Convert.ToInt32(Console.ReadLine());
27            Console.WriteLine(ContarFormas(n));
28        }
29        Console.ReadLine();
30    }
31 }
32
33
```

Line: 16 Col: 27

 Upload Code as File☐ Test against custom input

Run Code

Submit Code

Congrats, you solved this challenge!

✓ Test Case #0

✓ Test Case #3

✓ Test Case #6

✓ Test Case #1

✓ Test Case #4

✓ Test Case #7

✓ Test Case #2

✓ Test Case #5

✓ Test Case #8

Next Challenge

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