Project Euler #199: Iterative Circle Packing

This problem is a programming version of Problem 199 from projecteuler.net

n circles of equal radius are placed inside a larger circle such that each consecutive pair of inner circles is tangent to one another, all the inner circles are tangent to the larger one and do not overlap. There are $n + 1$ uncovered "gaps" which are to be filled iteratively with more tangent circles.
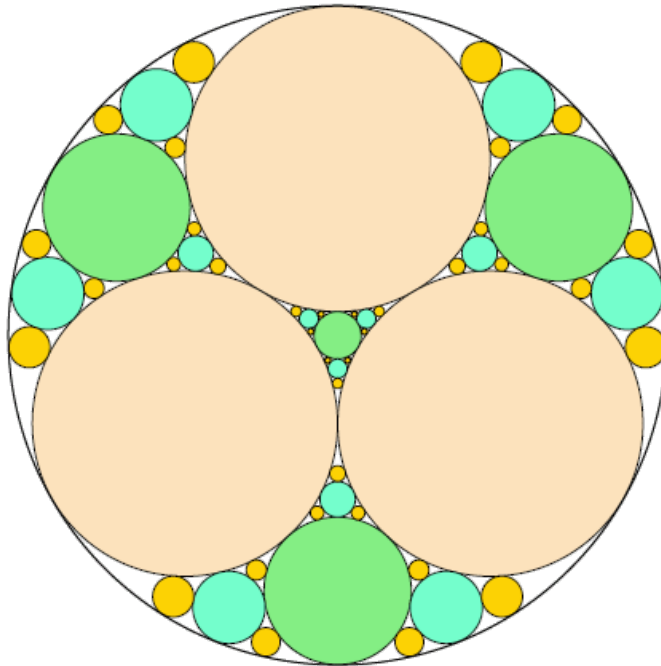
Picture for $n = 3$

At each iteration, a maximally sized circle is placed in each gap, which creates more gaps for the next iteration. After 3 iterations (pictured), there are 108 gaps and the fraction of the area which is not covered by circles is 0.06790342, rounded to eight decimal places.

What fraction of the area is not covered by circles after m iterations?

Input Format

Each test file contains exactly two integers separated by a single space: n and m.

Constraints

- $3 \le n \le 200$
- $1 \le m \le 16$

Output Format

Output exactly one number that is the area not covered by circles after all iterations. Your answer will be considered as correct if the absolute difference between it and the author's one does not exceed 10^{-8}.
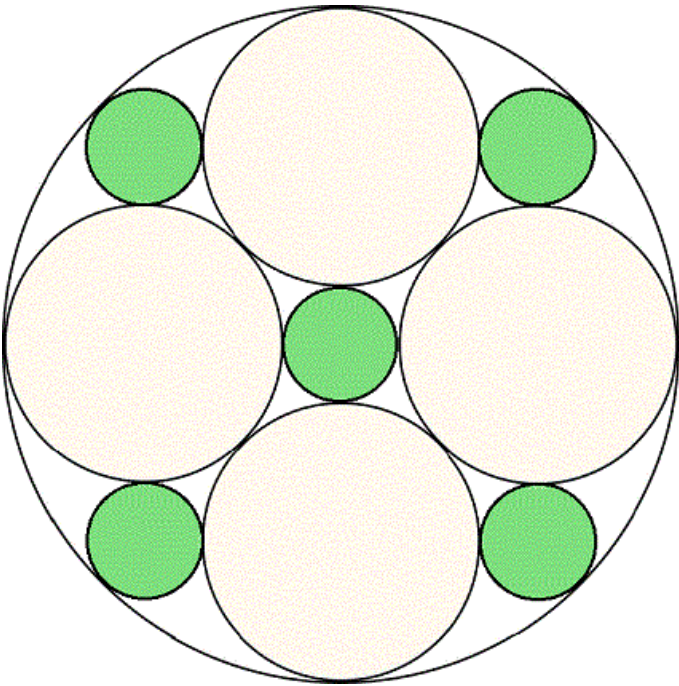
Sample Input 0

```
3 3
```

Sample Output 0

```
0.067903417174
```

Sample Input 1

```
4 1
```

Sample Output 1

```
0.166522241370
```

Explanation 1

The initial circles use ≈ 0.6863 of the big circle's space. The green circles added at the first iteration use ≈ 0.1472 of the space.