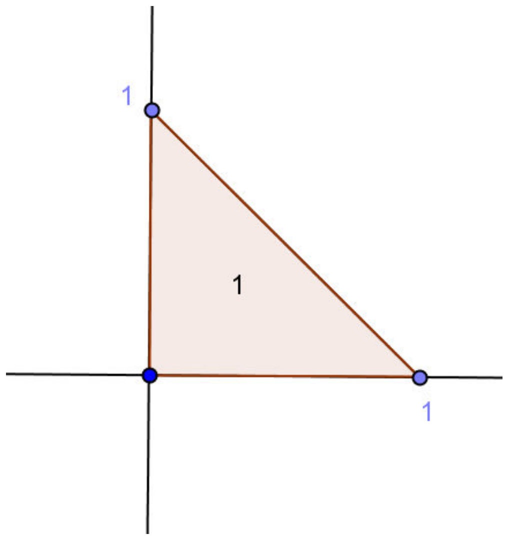
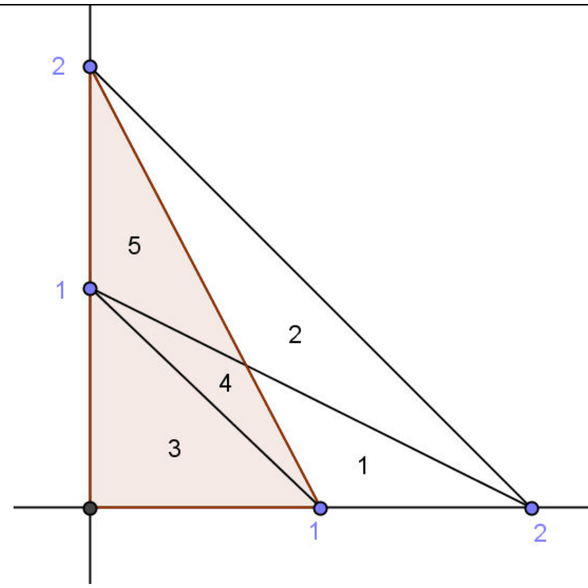
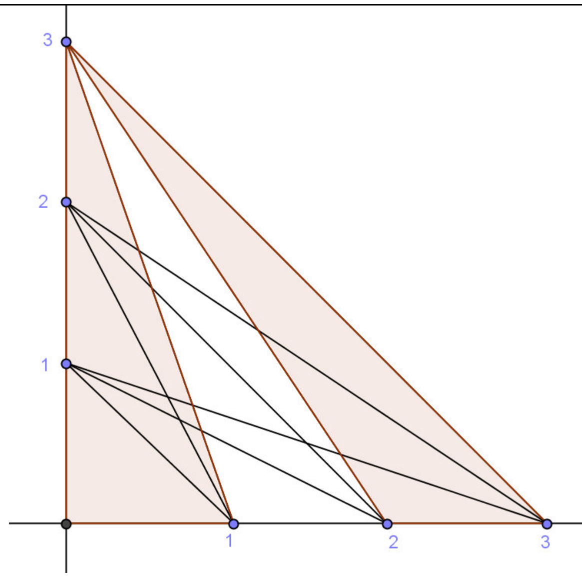


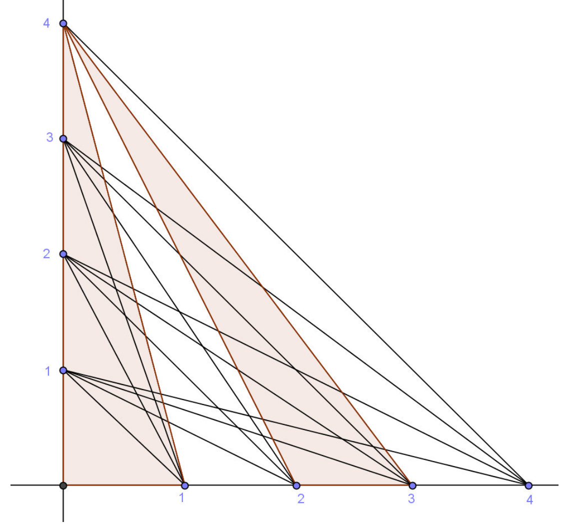
N=1. Regions: 1



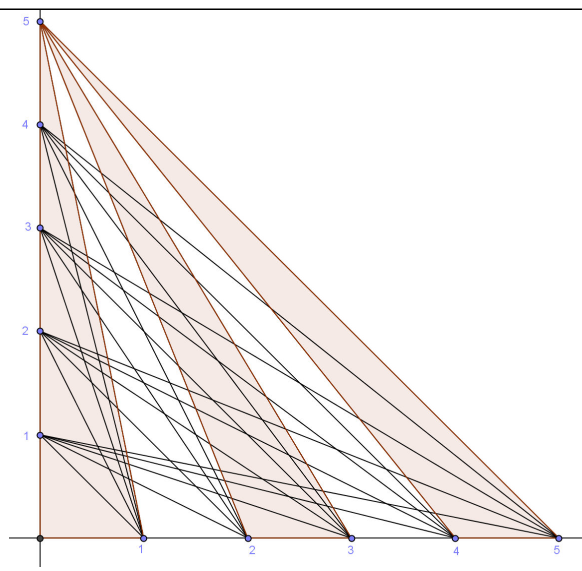
N=2. Regions: 5



N=3. Regions: 18



N=4. Regions: 52



N=5. Regions: 125

Empirical count:

Count regions on every triangle (colorized alternated), from right to left (as indicated for N=3). We observe some arithmetic progressions (AP):

For	Regions in triangles (from right to left) and totals	This sum is:
N=**1**	1 = 1	Sum of **1** terms of AP beginning with **1** and common difference = **0=** $\sum_{k=0}^{N-1} k$
N=**2**	2+3 = 5	Sum of **2** terms of AP beginning with **2** and common difference = **1=** $\sum_{k=0}^{N-1} k$
N=**3**	3+6+9 = 18	Sum of **3** terms of AP beginning with **3** and common difference = **3=** $\sum_{k=0}^{N-1} k$
N=**4**	4+10+16+22 = 52	Sum of **4** terms of AP beginning with **4** and common difference = **6=** $\sum_{k=0}^{N-1} k$
N=**5**	5+15+25+35+45 = 125	Sum of **5** terms of AP beginning with **5** and common difference =**10=** $\sum_{k=0}^{N-1} k$
Conjeture:		
N		Sum of **N** terms of AP beginning with **N** and common difference= $\sum_{k=0}^{N-1} k$

If we remember that $\sum_{k=1}^{n} p_k = \frac{n \cdot (2 \cdot p_1 + (n-1) \cdot d)}{2}$ for an AP beginning with p_1 and common difference d, it is easy to deduce that, if this conjecture is proved to be true, then the number of regions for N=n is:

$$a(n) = \frac{1}{4} n^2 \left(n^2 - 2n + 5\right)$$

which coincides with A125641.

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Feb 17-2013
Los Teques, Venezuela