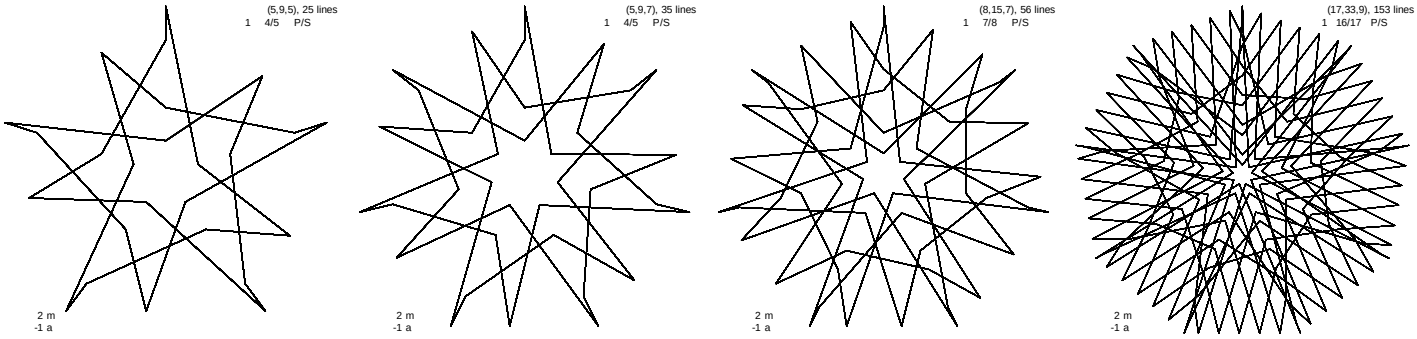
Creating functionally related equations: a *P*(*S*) example

Each of the three parameters in the Center Point Flowers *Excel* file is unlocked so that you can create functional relationships to test whatever idea you have about how images relate to one another. Think of this as a version of the material discussed in the functionally modified String Art explainer.

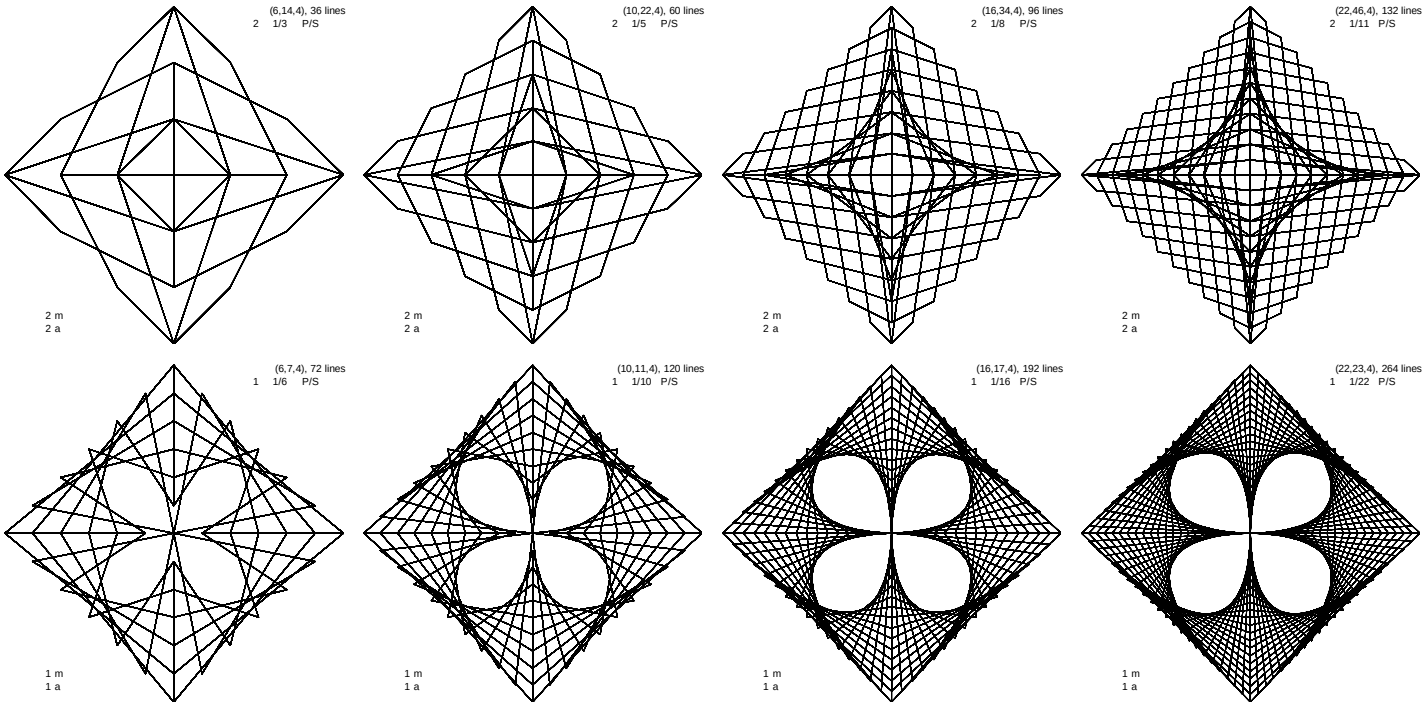
Suppose you want test images where ***P*** is a linear function of ***S***: ***P*** = ***mS***+***a***. You could type this into C1 directly and change m and a by changing this cell. A more efficient solution is to automate your testing by using the unlocked cells in green beneath the image. Here is a suggested way to accomplish this automation.

Type labels m in F39 and a in F40 then numbers in E39 and E40. Type =E39*B1+E40 in cell C1. This allows you to change C1 by typing different numbers in E39 or E40. For example, 3 and 0 always produces just the ***n***-gon and 1 and 0 produces the VF, an ***n***-gon pie cut in ***n*** equal pieces. Cells F30:G31 are also unlocked so that you can transfer the numbers to the image area if you want to do so by typing =E39 in F30, =E40 in F31, m in G30 and a in G31. This is how the images on this page were created simply by changing ***m*** and ***a*** and then using the ***S*** and ***n*** ⬍⬍ arrows.

*Irregular internal **n**-stars.* If ***P*** is a bit smaller than 2***S*** (so set ***m*** = 2 and ***a*** = -1) the first line will end close to the center on the ray from vertex 1. Here are 4 examples with different ***S*** and ***P***. Such images require ***nS*** lines or SCF = 3.



Overhead pyramid vs. 4-leaf clover. These ***n*** = 4 images share common ***S*** by column but have (***m***, ***a***) = (2, 2) versus (1, 1).



The top row has half as many lines because SCF = 2 versus SCF = 1 in the bottom row. One can see that half the subdivision endpoints are used in the top row by looking around the outer edge (with 3, 5, 8 and 11 used subdivisions) or by looking at levels along the 4 rays from the origin to the four vertices. The bottom row outer edges are ragged because ***P*** = ***S***+1 > ***S***. To make the outer edge smooth, type 1 in E39, -1 in E40 (or other ***a*** < 0) and adjust ***S*** so SCF = 1.