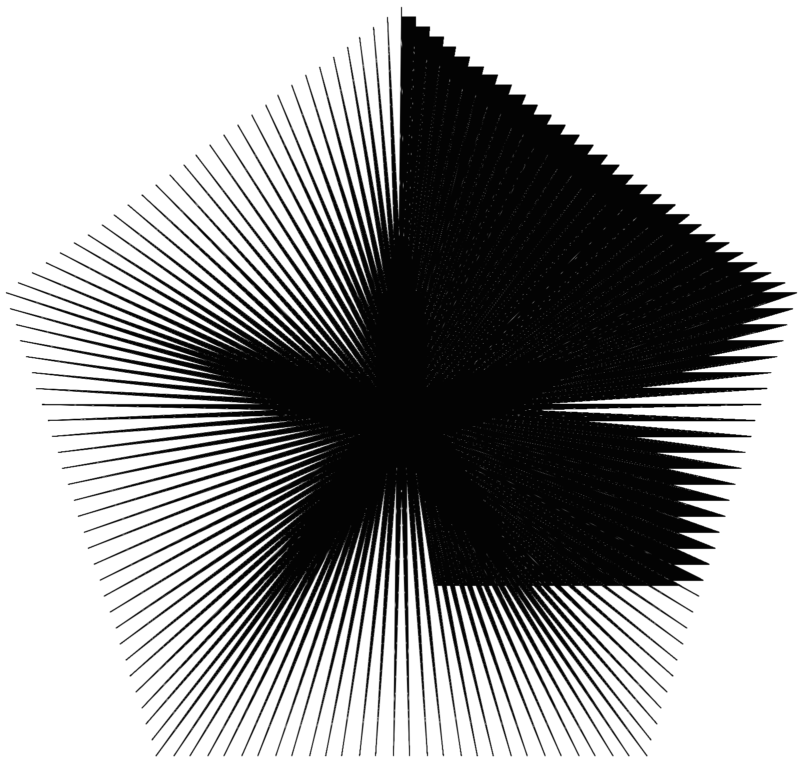
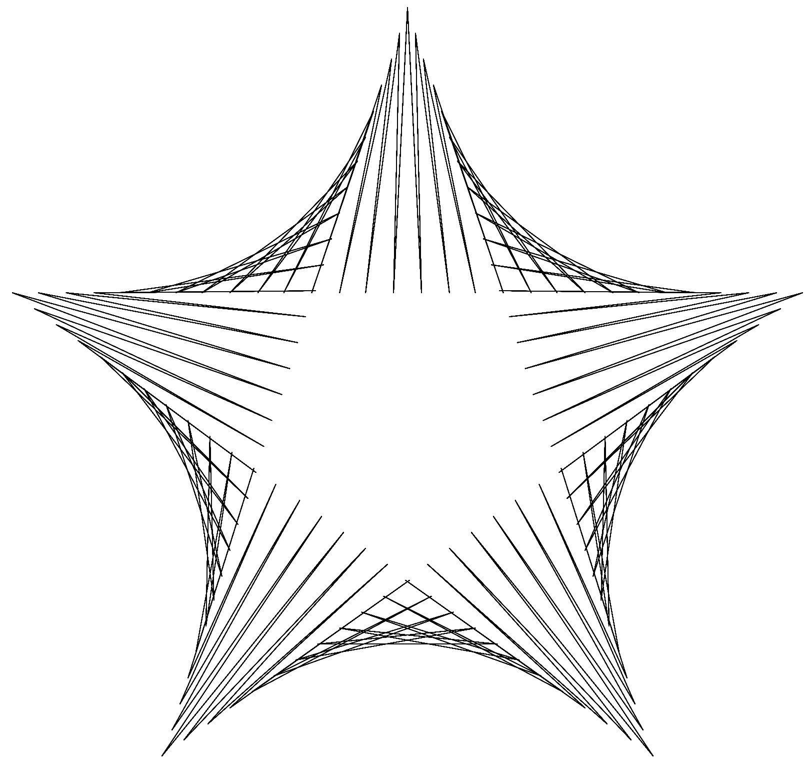
https://blogs.dickinson.edu/playing-with-polygons/file-2/

Porcupine Stars versus Polygons

(Porcupine images are created when ***P*** is the largest number less than (or smallest number larger than) ***n********S***/2)

The pentagonal porcupine polygon on the left has the same ***S***, ***P***, and ***n*** as the image on the right but the image on the right is based on a pentagram (***J*** = 2). Now many of the needles are pointing inward leading to an upside down pentagon of "empty" space. The two examples below show ***S*** = 29.





Multiple jump models do not always lead to images using all of the vertices. The image uses fewer vertices if ***n*** and ***J*** have factors in common. (See the discussion of **VCF**, the vertex common factor, for further detail.) This is the reason that one cannot create a continuously drawn 6 point star. But one can create two distinct 7 point stars (***J*** = 2 and 3), one 8 point star (***J*** = 3), and two 9 point stars (***J*** = 2 and 4). (The word distinct was used because each of those solutions can be seen using two values of ***J*** < ***n*** since the same image results for ***J*** and ***n-J*** jumps.)

Versions of each of these models are shown on the next page. The number of subdivisions between connected vertices has been reduced to ***S*** = 19 because the images are smaller in size in order to fit 6 on one page. The images are widely varied, but they all contain sharp points at subdivision endpoints.

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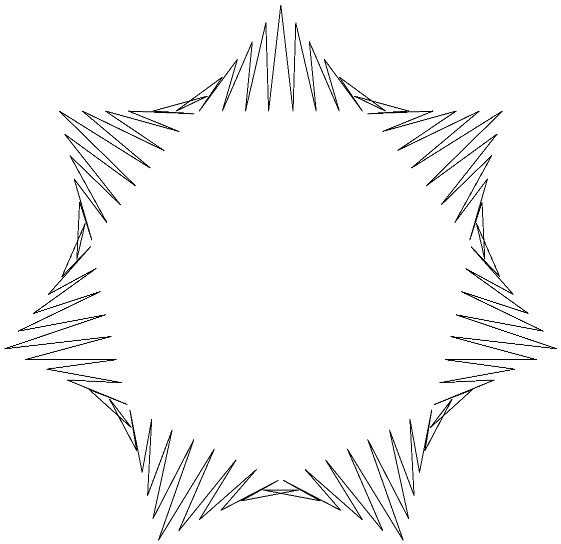
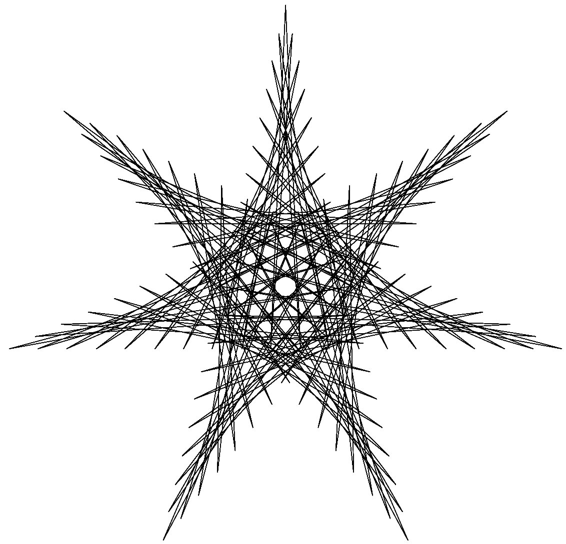
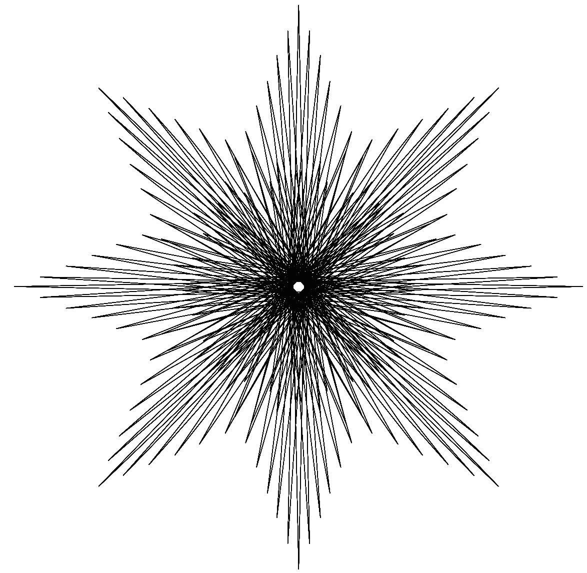
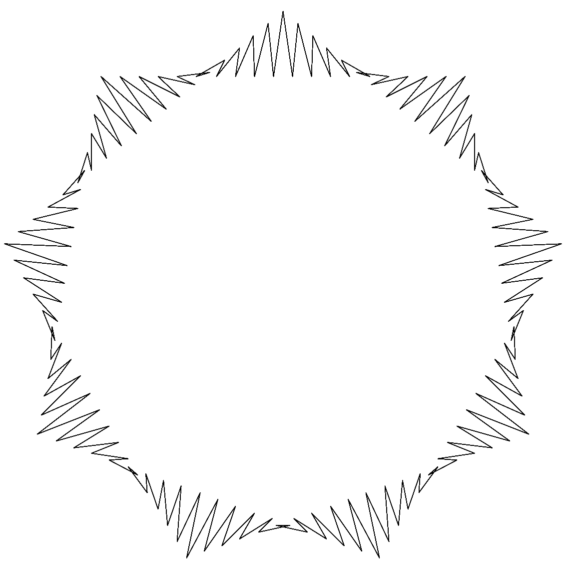
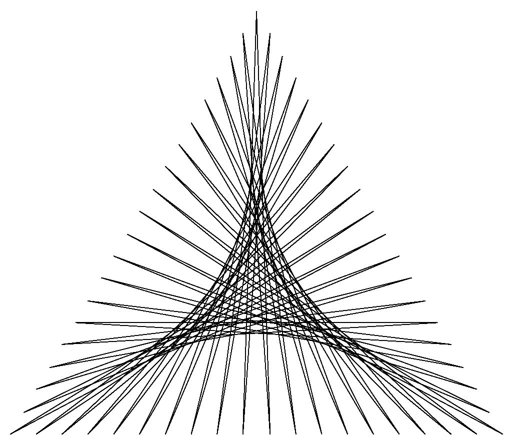
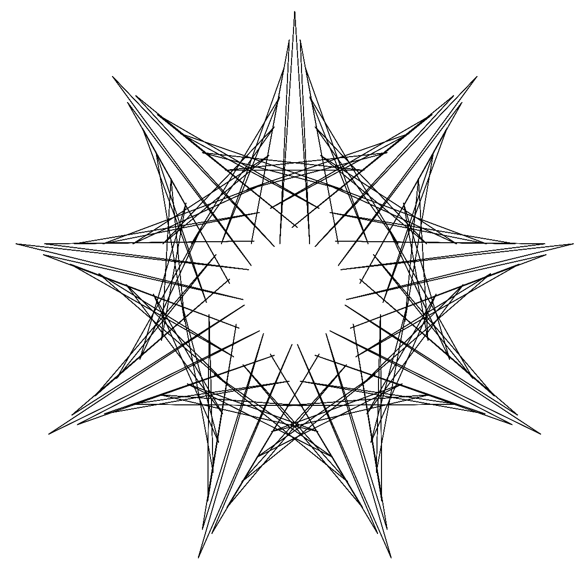




The first two on the top row are ***n*** = 7, the third is ***n*** = 8 and the bottom three all are based on ***n*** = 9. You should be able to explain what happened to the other vertices in the middle image given ***J*** = 3. One can see the commonality between the two left images and the right image on the page 1: each has ***J*** = 2 and ***n*** odd.

This is a link to the companion website for the last of these images: https://www.playingwithpolygons.com?vertex=9&subdivisions=19&points=85&jumps=4