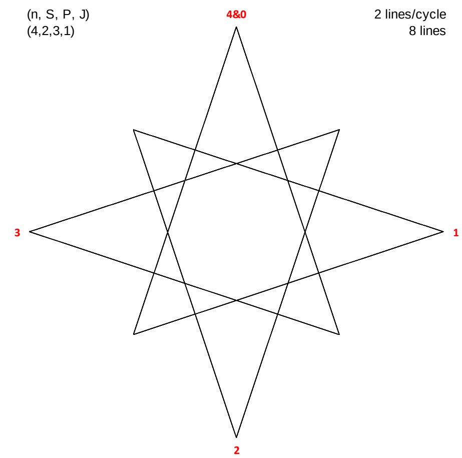
Create your own connections: Exploring Modified Brunes Stars

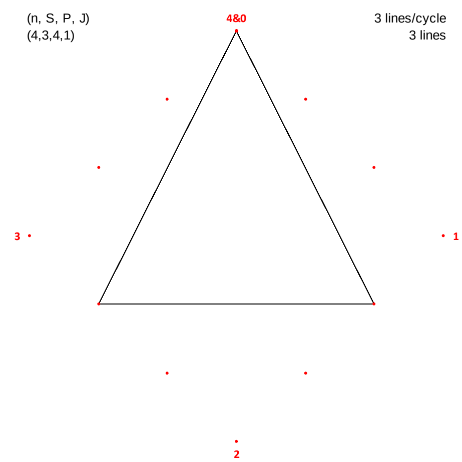
This explainer is not meant as an end unto itself but simply to provide an example to spark your interest in doing your own exploration of an image you find interesting.

The 8-point Brunes star, reproduced to the right, was used to introduce the distinction between subdivisions, ***S***, and points, ***P***. That image is based on ***n*** = 4, ***S*** = 2, ***P*** = 3, and ***J*** = 1. One might wonder what happens if we alter one or more of the parameters ***S***, ***P*** or **J**. (To focus on square-stars, we keep ***n*** = 4.)



Altering ***J*** is uninteresting in this situation (as long as ***n*** = 4) because ***J*** = 2 produced a vertical line and ***J*** = 3 produces the same image, drawn the other way because 3 = 4 – 1. And if you increase ***S*** holding ***n***, ***P***, and ***J*** fixed you quickly have a square with cross-hatched corners since ***S*** > ***P*** produces such images.

But suppose you alter ***P*** as you alter ***S*** maintaining ***P*** > ***S*** as you go. This will produce modified Brunes stars. We can quickly automate this process and obtain regular square-stars with more than 8-points using the automated ***P*** file.



Instead of typing =M35 in E1 (which avoids the *donut hole*), type =C1+E36 in E1 as an equation for ***P***. The resulting value for ***P*** > ***S*** as long as the addition factor ***a*** > 0 (in E36).

Suppose you set ***a*** = 1 using the ⬍ arrows in E36:E39. As you increase ***S*** from 2 to 3 you will initially be disappointed because you end up with the triangle to the right. This occurs because SCF = 4 and the image uses only 1/4th of the subdivision points.

The process produces stars that have 4***S*** points if SCF = 1. For example, increase ***a*** by 1 to get the bottom left 12-point square-star. If you increase ***S*** to 9 and ***a*** to 8 you get the bottom right 36-point square-star.

As you scroll through ***S*** and ***a*** values you will find that certain patterns will emerge. For example, if ***S*** is even, then ***a*** must be odd and, if ***a*** = ***S***, then the image collapses to a vertical line.