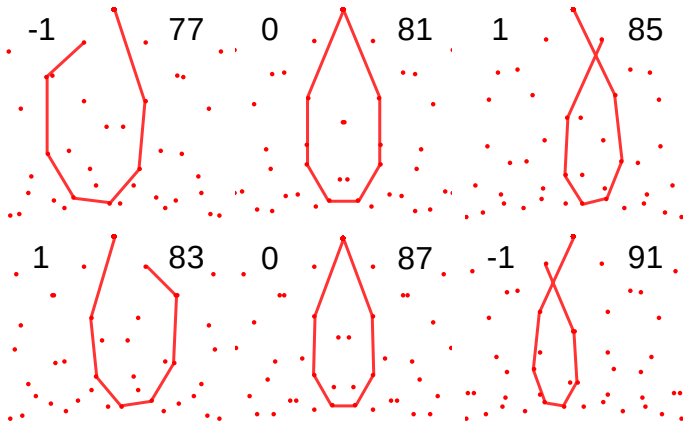
Cracked Open and *Overly Closed* Images

We saw that *The 7-Line Generator Function* (***P*** = ROUND(***k*·*n*·*S***/7,0) for ***k*** = 1, 2, or 3) produces images where the end of the 7th line is within 3 vertices of the top. Using this generator function, we find that the first 7 lines of images that are not zero remainder are like *cracked open* or *overly closed* versions of nearby zero-remainder images. The zero-remainder images are complete since the 7th line ends at the top.

The six images at right show the difference between cracked open images on the left and overly closed images on the right. The numbers to the top left in each image are the endpoint of the 7th line relative to the top. Values for ***n*** were chosen so that the endpoint is either 0 or ±1 and so that the underlying image is a 7-gon. Subdivision endpoints are **red** dots.



Top Row is ***n*** = 27, Bottom is ***n*** = 29. L-R Cols. ***S*** = 20, 21, 22. ***J*** = 7 for all. Number at top left is 7th endpoint, at right is ***P***. At Left are ***Cracked Open***, at Right are ***Overly Closed***, 7-gons.

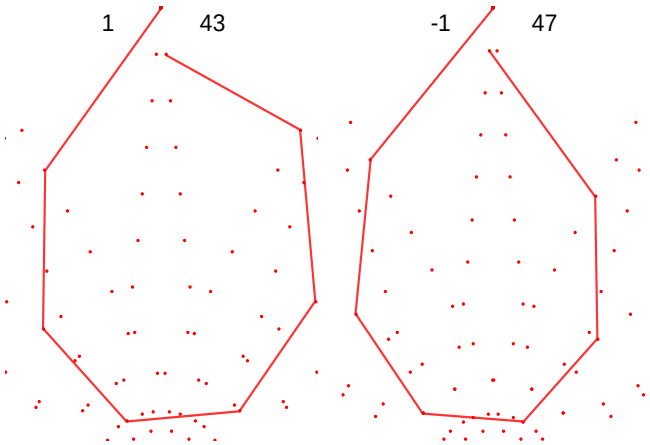
This same point could be made with 7,2-stars or 7,3-stars, or more complex underlying 7-line zero-remainder images as well, but in this case, it is more difficult to see the relationship of a nearby non-zero remainder image to its zero-remainder counterpart.

These images make it appear that one needs to have a crossover of last and first line to be an overly closed image but that is not accurate. Notice that the first line ends to the right of the midline in the top row but ends to the left of the midline in the bottom row.

*The defining feature of a **cracked open** image is that the end of the 7th line is on the **opposite side** of the midline as the end of the first line* (and hence the first line).

*The defining feature of an **overly closed** image is that the end of the 7th line is on the **same side** of the midline as the end of the first line.* The first and 7th lines need not cross for this to happen.

The two larger 7-line images show the point. The only difference here is ***n*** = 15 so the small images are larger, and the VF is now a 15,7-star which is the sharpest possible 15-point star.



The left image, based on ***S*** = 20, is *cracked open* because the end of the 7th line is to the right of the midline given the end of the first is to the left. They are on opposite sides of the midline.

The right image, based on ***S*** = 22, is *overly closed* because the end of the 7th line is to the left of the midline and the end of the first is to the left. They are on the same side of the midline.

Beneath these first 7 lines are their completed images (with first 7 lines overlaid in **red**). The left has 300 lines, the right has 330, but both look quite similar. The interesting thing is that each gets drawn in the opposite fashion. Subsequent sets of 7 produce a swirling 7-gon that creates the image clockwise (because it follows the VF from endpoint 1 to 2 to … since the 7th line was the first endpoint on the 1st VF line). The right swirls counterclockwise because 7-gon end points go from 329 to 328 to … since the 7th line ended on the last subdivision of the last VF line (at 329 or -1).