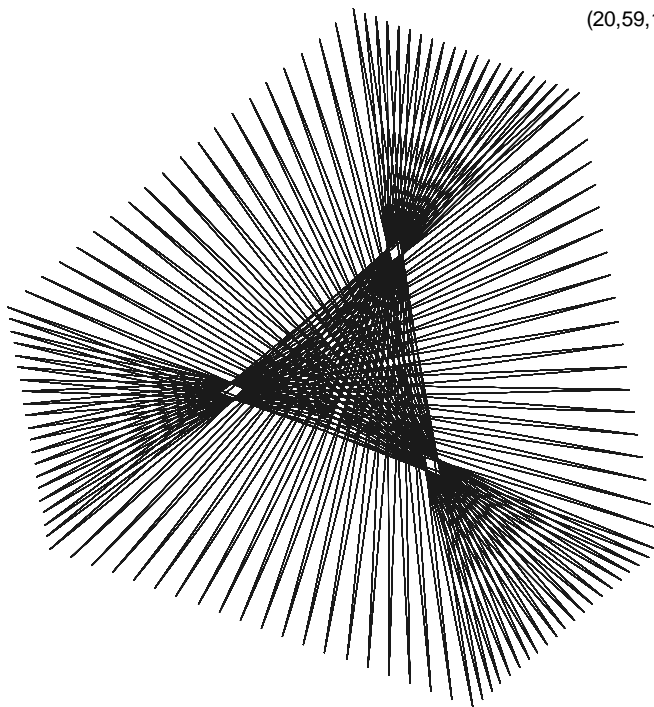
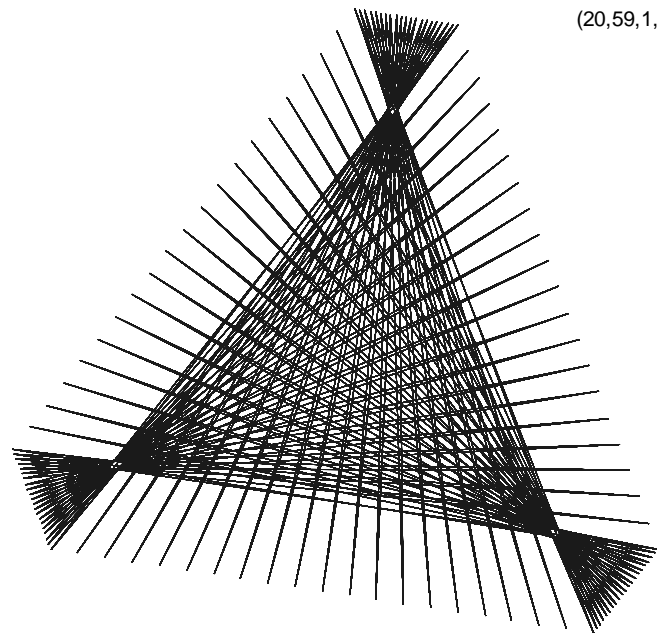


Needle Fans and Fan Blades

There are a variety of versions of porcupine images (where if P increases by 1 the image is a single line) given multiple jumps but one of the most interesting to watch being formed is something that might be called needle fans, in reference to the folding fans. The smallest n for such a fan is 9 and the jumps that are used to create this are 1,2 (or 2,1). The smaller side is where the “gathering point” is for the fan blades (in this instance needles) come together at almost a point. The image on the left has a much larger small side than the one on the right because of the difference in jumps between small and large jump. Both images have 120 needle points, 20 on each side. Similar images can be made by increasing the larger jump by 1 and n by 3 (notice J_2 increased by 4 in going from left to right and n increased by 12). The links below take you to the companion website. Watch these images being drawn by clicking *Toggle Draw*.



(20,59,1,2,9)



(20,59,1,6,21)

<https://www.playingwithpolygons.com?vertex=9&subdivisions=20&points=59&jumps=1&jumps=2>

<https://www.playingwithpolygons.com?vertex=21&subdivisions=20&points=59&jumps=1&jumps=6>

Variations on this theme: These images require $VCF > 1$ to create different density areas within the image. In the above two images, $VCF = 3$ on the left and 7 on the right (since the images above rotationally repeat 3 times) $3 * VCF = n$.

Changing overall density: Images can be made more or less dense by adjusting S and P .

Changing the type of polygon: Other odd polygons can be created by following similar tactics, but even polygons lead to Fan Blades rather than folding needle fans. Here are a couple of examples.

4-Blade Fan: <https://www.playingwithpolygons.com?vertex=12&subdivisions=20&points=79&jumps=1&jumps=8>

6-Blade Fan: <https://www.playingwithpolygons.com?vertex=12&subdivisions=20&points=119&jumps=1&jumps=9>

Pentagram: <https://www.playingwithpolygons.com?vertex=25&subdivisions=20&points=99&jumps=1&jumps=4>

Pentagon: <https://www.playingwithpolygons.com?vertex=25&subdivisions=20&points=99&jumps=1&jumps=14>

7-gram fans: <https://www.playingwithpolygons.com?vertex=21&subdivisions=20&points=139&jumps=1&jumps=8>

7-gon fans: <https://www.playingwithpolygons.com?vertex=21&subdivisions=20&points=139&jumps=1&jumps=14>