Spinning Needle Stars, Take 2: Even and Odd Dancing Partners
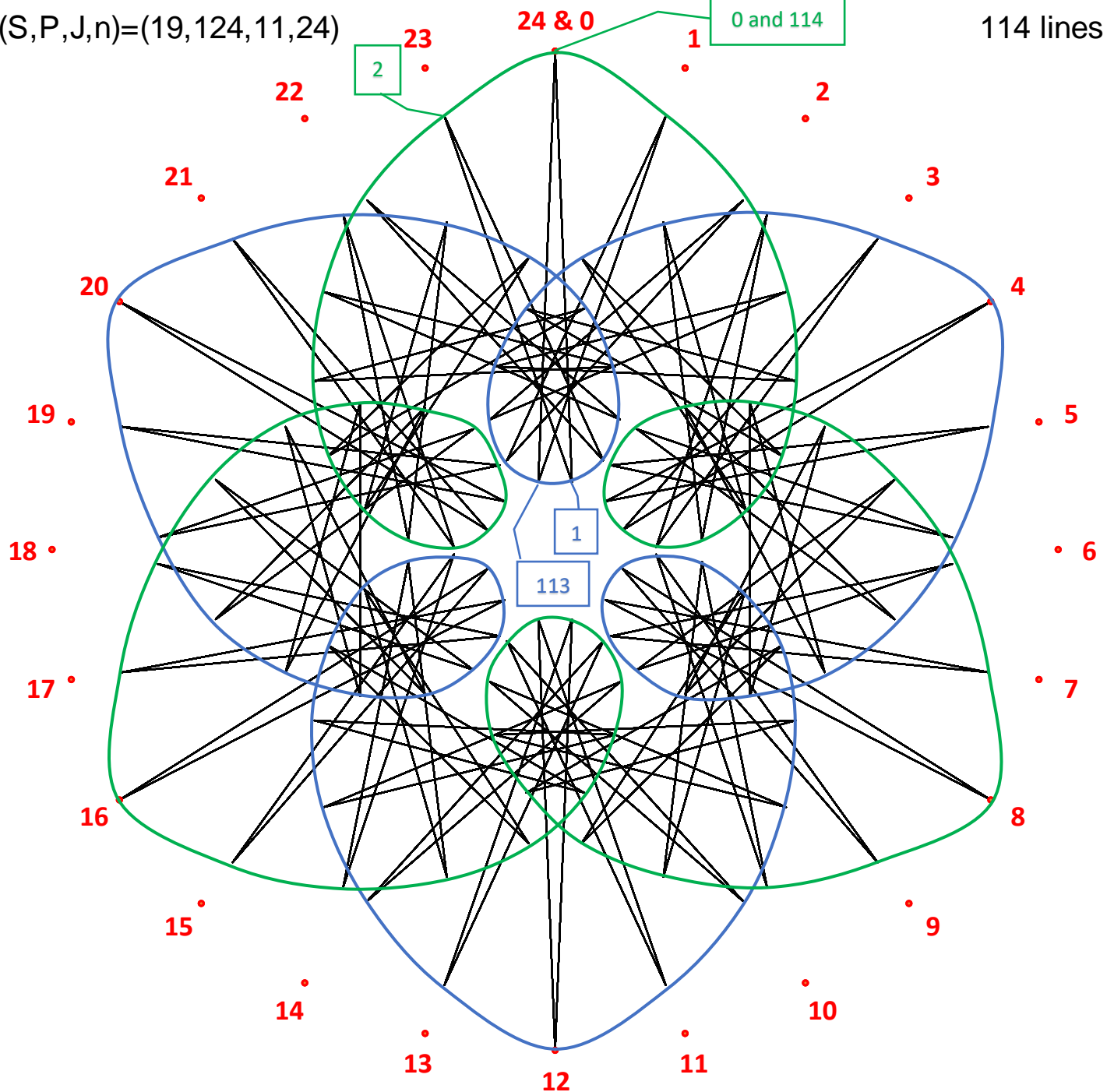
Click *Toggle Drawing*: https://www.playingwithpolygons.com?vertex=24&subdivisions=19&points=124&jumps=11

(S,P,J,n)=(19,124,11,24)

114 lines

Every line segment has an **even** and an **odd** endpoint. As a result, one can consider what happens to every other end point to see if a pattern emerges. Because a spinning needle fan is a *one-time-around.* maximal level change image, the pattern is particularly easy to see. The image above shows two hand-drawn curves, **blue** and **green**. **Blue maps all odd endpoints** and **green maps all even**. Note that both images are identical, but simply rotated 60°. Each has 3 inner loops and 3 outer leaf-petals, both drawn counterclockwise. **Even** and **odd** are dancing partners, each following one another.
Blue odd values. 1st **blue** vertex point (**20**) is at the 19th line (curling around from point **1** to **20** and is the **10th odd point**).
    The 2nd **blue** vertex point (**12**) is at line 57 = 3*19, and the 3rd **blue** vertex point (**4**) is at line 95 = 5*19.
Green even values. 1st **green** vertex point (**16**) is at the 38th line (looping around from point **2** to **16** and is the **19th even point**). The 2nd **green** vertex point (**8**) is at line 76 = 4*19, and the 3rd **green** vertex point (**24&0**) is at line 114 = 6*19.

(S,P,J,n)=(19,124,11,24) 114 lines

24 & 0

23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

M 9 28 10 ? 29 ?
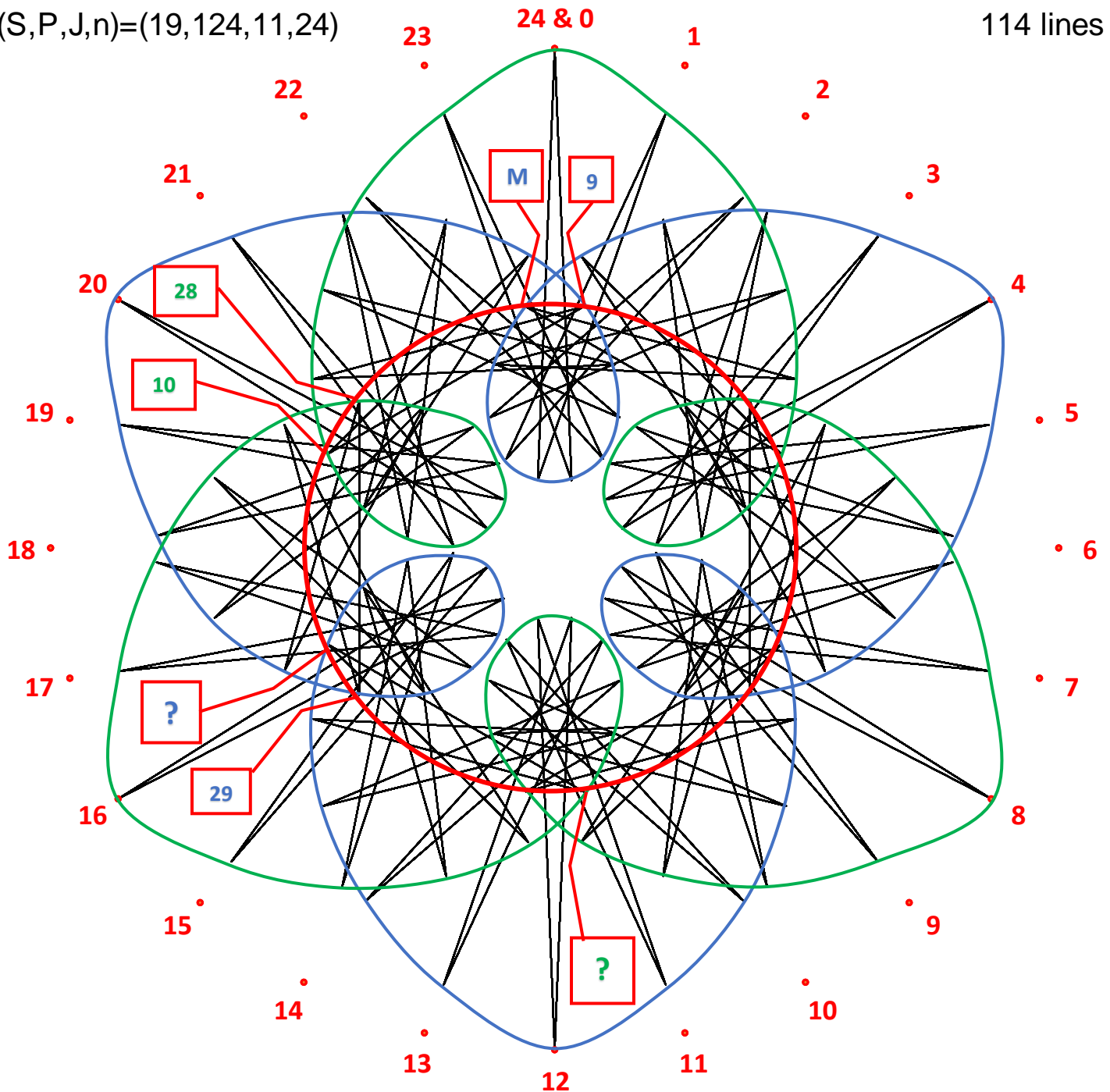
Here is one more take on the same image. On p. 2 of the first explainer on spinning needle stars there is an Excel sheet that lines 9 and 10 both end at Level 5. A **red circle** has been superimposed on the image so that you can see this level. This can be thought of as the cross-over between the leaf and loop part of the image. Each leaf has 9 points at Level < 5 and each loop has 8 points with Level > 5. By looking inside and outside the circle you can count these points.

Since there are 6 cycles, there are 12 points at Level 5, the first three pairs of which are noted on the image above. Two pairs have endpoint values attached and the third set simply shows question marks, one **odd** the other **even**.

Without manually counting along the green and blue curves, can you determine the value of **?** and **?** above?

The last 6 Level 5 endpoints are mirror images of the first 6 using the vertical diameter as the axis of reflection. One such point is labelled **M**. This endpoint is numbered according to the following rule: Reflected end = 114 − original number so that **M** = 114 − **9** = **105**. Note that each reflection maintains its property of being either **even** or **odd**.