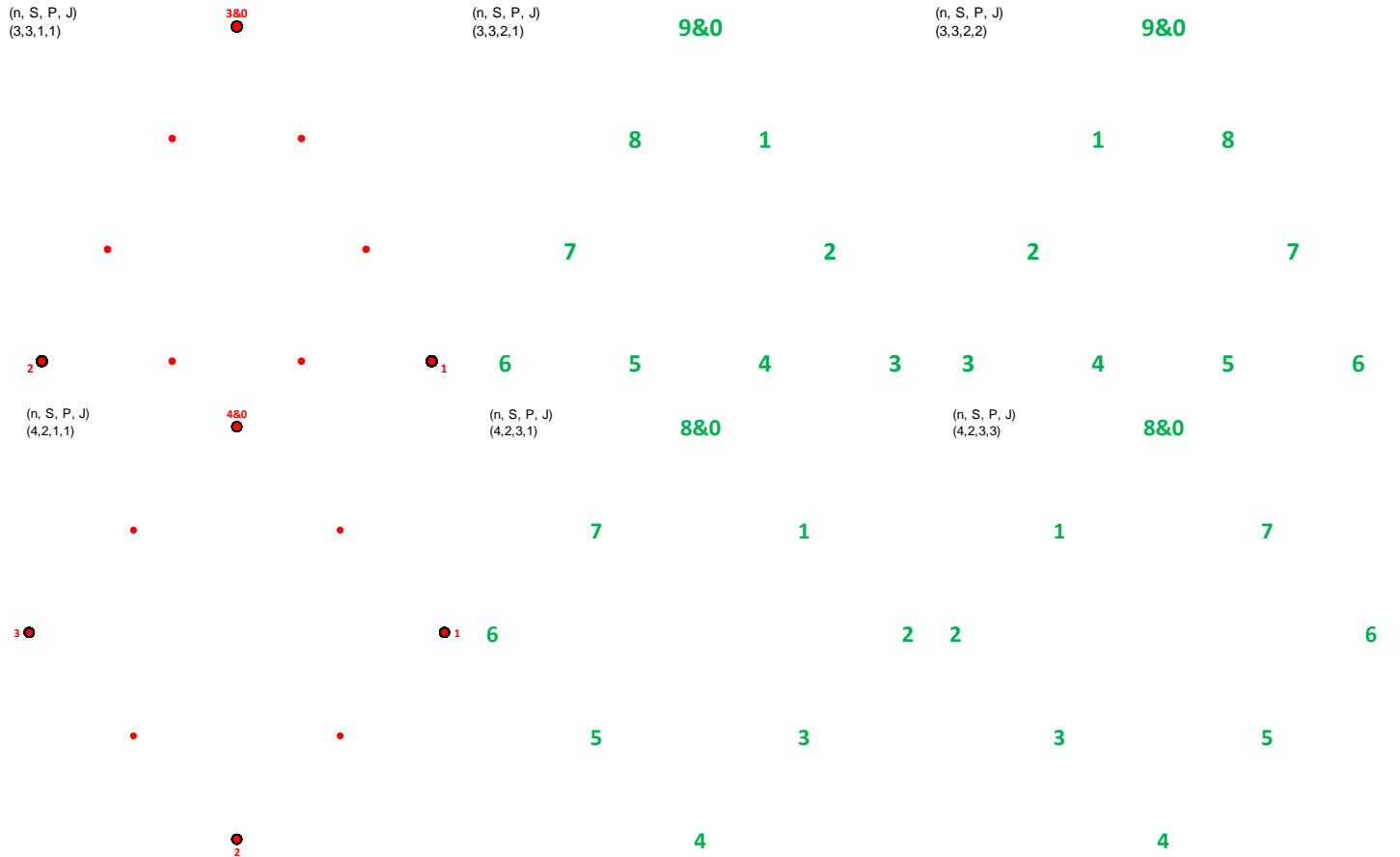# A Primer on *S*, the number of *Subdivisions* between vertices

*The most important concept in truly understanding String Art images is to understand subdivisions, **S**.* (We need to understand *S* before we draw an image. We discuss drawing Images using these dots in the *P* primer.) This primer has three rows of images. The left column in the first two rows have large **black dots at vertices** (*n* = 3 top and *n* = 4 middle) with *S* equal-sized subdivisions with *S* **red subdivision dot endpoints** between each vertex (*S* = 3 top and *S* = 2 middle). Because this is true for all *n* line segments connecting vertices, there are a total of *n·S* subdivision dots in the image. Note that a vertex is also an endpoint of a subdivision (which is why each **black dots** has a **red dot** in the middle).

The other columns in rows 1 and 2 show how subdivision dots are counted based on *J* vertex jumps. The middle column shows the typical situation with *J < n*/2, here *J* = 1, and the right shows that the same dots are counted in the reverse order when *J = n*-1. This is why the **numbered green subdivision endpoints** reverse direction between middle and right columns. Both versions produce the same final static image and only differ in the order in which the image is drawn.

(n, S, P, J) (3,3,1,1) — 3&0

(n, S, P, J) (3,3,2,1) — 9&0
8   1
7   2
6   5   4   3

(n, S, P, J) (3,3,2,2) — 9&0
1   8
2   7
3   4   5   6

(n, S, P, J) (4,2,1,1) — 4&0

(n, S, P, J) (4,2,3,1) — 8&0
7   1
6 ·1
5   3
4

(n, S, P, J) (4,2,3,3) — 8&0
1   7
2   2   6
3   5
4

Both bottom images show only the **numbered subdivision points** and have *n* = 5 and *S* = 2 so there are 10 subdivision points in each image. When *n* > 4, *J* > 1 is how stars are created. At left is a pentagon and at right is a pentagram.

(n, S, P, J) (5,2,3,1) — 10&0
9   1
4 8   2 ·1
7   3
3 6   5   4 2
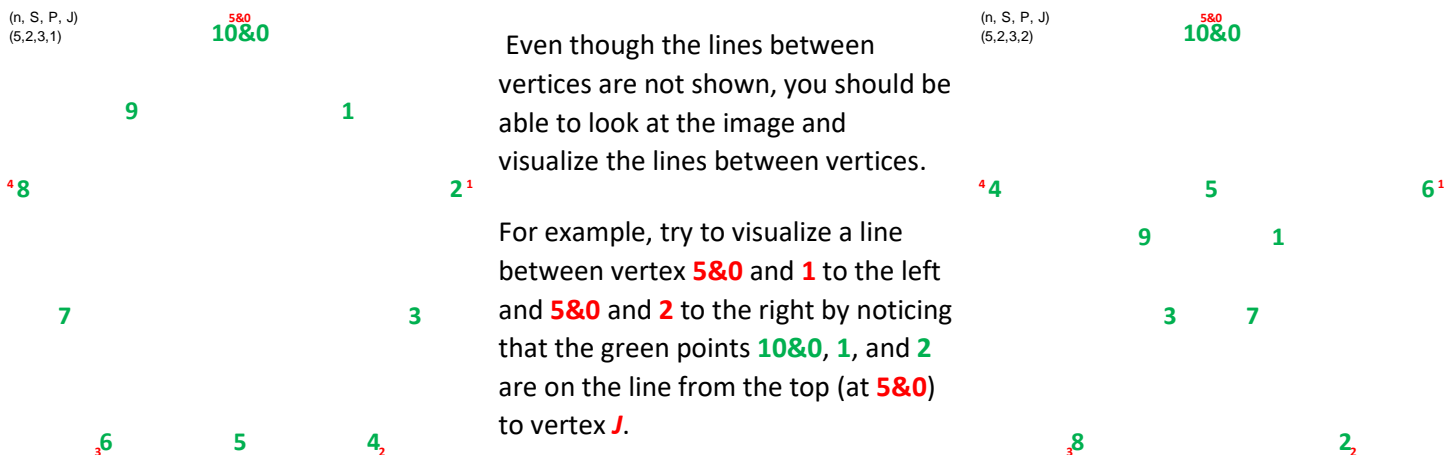
Even though the lines between vertices are not shown, you should be able to look at the image and visualize the lines between vertices.

For example, try to visualize a line between vertex **5&0** and **1** to the left and **5&0** and **2** to the right by noticing that the green points **10&0**, **1**, and **2** are on the line from the top (at **5&0**) to vertex *J*.

(n, S, P, J) (5,2,3,2) — 10&0
4 4   5   6 ·1
9   1
3   7
3 8   2 2