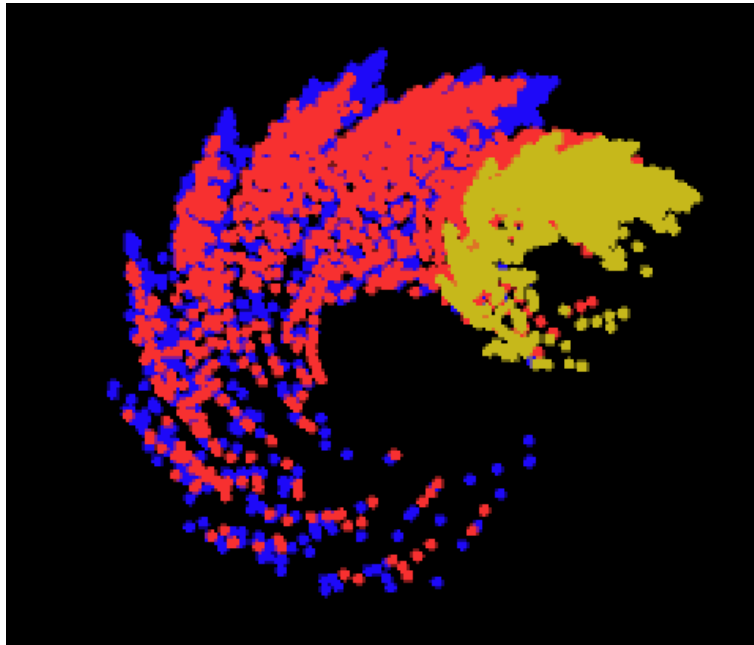
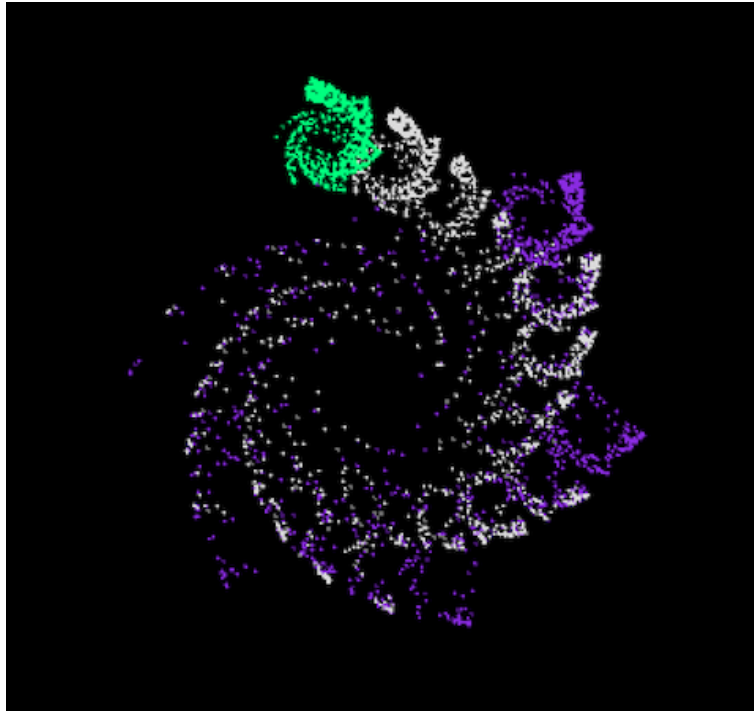


This project involves morphing one fractal image into another and building the fractal movies. The first fractal image shown in the movie is created using the affine transformations below:



$$\begin{aligned}
 f_{blue} \begin{pmatrix} x \\ y \end{pmatrix} &= \begin{bmatrix} 0.97 & 0 \\ 0 & 0.97 \end{bmatrix} \begin{bmatrix} \cos(30^\circ) & \sin(30^\circ) \\ -\sin(30^\circ) & \cos(30^\circ) \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} & f_{red} \begin{pmatrix} x \\ y \end{pmatrix} &= \begin{bmatrix} 0.97 & 0 \\ 0 & 0.97 \end{bmatrix} \begin{bmatrix} \cos(5^\circ) & \sin(5^\circ) \\ -\sin(5^\circ) & \cos(5^\circ) \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} \\
 f_{orange} \begin{pmatrix} x \\ y \end{pmatrix} &= \begin{bmatrix} 0.45 & 0 \\ 0 & 0.45 \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 4 \\ 2 \end{pmatrix}
 \end{aligned}$$

And the last fractal image used the affine transformation below:



$$g_{blue} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{bmatrix} 0.89 & 0 \\ 0 & 0.89 \end{bmatrix} \begin{bmatrix} \cos(120^\circ) & \sin(120^\circ) \\ -\sin(120^\circ) & \cos(120^\circ) \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} \quad g_{red} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{bmatrix} 0.89 & 0 \\ 0 & 0.89 \end{bmatrix} \begin{bmatrix} \cos(-20^\circ) & \sin(-20^\circ) \\ -\sin(-20^\circ) & \cos(-20^\circ) \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$g_{orange} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{bmatrix} 0.18 & 0 \\ 0 & 0.18 \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} -60 \\ -19.7 \end{pmatrix}$$

### Colors Consideration:

I've chosen the background color as **black** the whole movie because it give the most contrast visual effect for the colors I chosen for my fractal image which include **blue**, **red**, **orange**, **magenta**, **purple**, **lightgray** and **green**. The colors choice for first fractal image start with blue, red and orange because I found out that this 3 colors combination looks well when contrast to each fractal. Then the second colors combination goes with magenta, lightgray, purple and green during morphing, these colors have good contrast to the first color combinations and still looks great in the black background.

### Animations Consideration:

The movie screen size start with 1024x768 pixels which I found out this size is best fit for my fractal movies animation. Furthermore, I've planned to show the first fractal images from the top left corner starting with **x = 160** and **y = 120** in **screen coordinate system** and then find out the interpolation of x-screen in between (0,x) and (1, 512); in which 512

pixels is the half of whole screen width and then doing the same interpolation for y-screen coordinate as shown in this code: `translate(160+352*p, 120+264*p)` . This give a **transformation effect** from top left corner to the middle of the screen. Besides that, I've also included a **rotation effect** shown in this code: `rotate((1-p)*4*PI)` ; I've chosen a value of 4 which rotate at the speed I desire, the higher this value the faster the fractal image rotate. With the combination of translation, rotation and diminishing the stroke weight, I'm able to achieve a visual effect that the fractal image is **falling into the middle of the vortex and diminished** at the end. The fractal image affine transformation is changed from one to another by interpolation and lastly the image end up in the g transformation shown above. The process of seeing the fractal image morphed into another is really exciting and fun!

### Effects Consideration:

I've growth my interest of learning processing during the process of doing this project, so I decided to explore more and add some effects to this fractal movie. The first thing I come out with is to add some **blinking effect** in between 0.5 to 0.7 seconds during the morphing stage, I implemented this blinking effect by setting a switch condition and changing the **strokeWeight function** with value of 0.5 and 1, and the result is pretty cool. Besides that, I've also added **music** to the movies by importing the **minim library**. The music I chosen give a mystery feel when the fractal image morphing from one to another. And lastly, I decided to show a "Thank you for watching!" text that shown on the middle of screen when the fractal image diminished at the end.

### Conclusion:

Lastly, I would like to mention that this project is really fun and I've learned a lot during the process, including learning and thinking how to make the transformation, rotation and some visual effect with **Processing**. This project also given me a chance to explore into the world of **Computer Arts** which is really cool and fascinating! Lastly, this is the screenshot of my movie which I think it is pretty cool as shown below:

