Intro  
Music has been an important part of many people’s lives and it serves multiple purposes some being for religious purposes, entertainment, for calming and relaxing oneself from the troubles of daily life and finally in the medical industry. There are certain elements of music that may help in music therapy and with sequences of music known to stimulate brain activity and activate parts of the brain to help with the healing of wounds or helping cure mental health disorders like depression and anxiety, memory problems like Alzheimer’s etc.

Rationale:

Having been exposed to a plethora of developing musical genres from a young age, I have been trying to organise my music based off the mood I am feeling at a point in time. I find it astonishing that it is really hard to classify music and I have spent a lot of time trying to classify the music and I haven’t been able to find a good method of classifying music based on mood.  
 As an avid fan of technology, I have also found that by putting music on visualizer technology such as visualisers or oscilloscopes, one can see the pattern of each musical note which resembles a sine wave when put through these instruments. “An oscilloscope is a laboratory instrument commonly used to display and analyse the waveform of electronic signals.” (<https://www.techtarget.com/whatis/definition/oscilloscope>). This will be helpful in mapping out musical notes in order to achieve the aim of this exploration.

The outcomes/results of this exploration will help people across the world by bringing a sense of calmness through music as a result of a mathematical investigation with implications on solving health problems and helping musicians create music catered to the mental health crisis.

Aim:

In this exploration I will be exploring how Graph transformations and the Fourier series will help model notes of a musical octave and evaluate which notes can be used to create a small tune along with analysing the impact of this on the music therapy industry.

Background:  
Upon Researching about the best way to create one model which maps the transformations from one note to another, I came across Fourier transformation a method which takes a periodic or time based pattern and measures every possible cycle and returns the “ amplitude, offset, & rotation speed for every cycle that was found” (<https://betterexplained.com/articles/an-interactive-guide-to-the-fourier-transform/>)

The fourier series

Methodology  
This exploration will first aim to model the notes of an octave using modelling and non-linear regression, followed by the graph transformation for the same notes from octave to octave