Riemann Summary

AKA Calculus with Coding

Synopsis:

Our project is an interactive computer program aimed at teaching and understanding how Riemann Sums can be used to estimate the area under a graph's curve. The program accepts many different functions and parameters, as well as allowing to change the width of Riemann rectangles used to calculate area. Ultimately, this project will be helpful in introducing the concept of evaluating integrals to find the area under a curve based on solving a Riemann Sum of infinitely small widths to approximate a very precise answer.

$$\int_a^b f(x)dx = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i^*)\Delta x$$

Where:

a and b are the x-coordinate bounds of the function f(x)

dx represents rectangles of infinitely small width at a certain point on the function's graph

The right side of the equation represents the addition of an infinite amount of lefthand Riemann Sum rectangles of width Δx (the limit of Δx approaches zero) and heights of f(x) corresponding to each sequential change in x.

Applications:

Riemann Sums form the backbone of calculating integrals. In the real world, integrals are vital parts of physics and electronics. Integrals can be used to find the area under a curve, however they can also be used in calculating velocity, force, energy, and distance. Simultaneously, integration is utilized by electronics, such as in machinery manufacturing or regulating temperatures in air conditioning units and fans. Integrals also allow people to find the volumes and densities of different objects. This is especially helpful for engineers and designers in building safe structures and comparing different materials for a project. Not to mention the many other fields such as economics and chemistry in which integrals are apart of many equations. So, in short, integrals and Riemann Sums are an essential component of the math world, and you will come into contact with things that use or required integrals to create every single day.