Sphere Tracing is a technique for rendering implicit surfaces using geometric distances. It computes 2D images from 3D scenes. Rays are cast from the camera focal point and iteratively marched until they intersect with objects which are defined via signed distance functions.

This project involves implementing a sphere tracer which can render scenes composed of simple shapes (spheres, boxes, planes, tori).

Potential extensions include rendering fractals (e.g, the Mandelbulb), using multiple light sources, implementing reflections, anti-aliasing, etc.

Various components of the sphere tracer will have to be optimized:
- the 3D transformations
- the actual sphere tracing
- the signed distance functions which define shapes
- the interactions of all the above

A set of standard benchmark scenes will be provided.

Reading:
- [The original Sphere Tracing Paper](#)
- [A Tutorial on Sphere Tracing including Background Material](#)
- [List of (unoptimized) distance function implementations for various shapes](#)