# Term Project Proposal

Group members: Levi Homer and Kieran Morford

1. Describe the project

Our goal is to make a basic ray tracing sandbox that includes can use several different thin lenses and mirrors. This sandbox would allow the user to input parameters for the lenses and mirrors (concave/convex, diverging/converging etc.) in the simulation. Our hope is to be able to have multiple lenses and/or mirrors at the same time in the sandbox. However, if it proves to be too difficult or time consuming then we will focus on making one lens or mirror work at a time. We also want to have it interactable in real time so you can see how the components interact. Overall, we will learn more about what is feasible as we begin learning how to accomplish our main focus of a basic sandbox.

2. How the work will be divided among the group members.

Levi will start by making modules that preform the calculations for the path the rays will follow using the thin lens equations and mirror equations, then help Kieran to represent the rays graphically and implement the mathematics by connecting them to the graphical elements. Kieran will focus on the graphics of the simulation, the representation of the rays, lenses, and mirrors. Including making a simple way to plug in the mathematical back end. He will then work on the interactive elements of the simulation and making the interface. Towards the end we will collaborate on any unfinished details and work out final bugs. If more work needs to be divided later, we will collaborate to decide who does what.

3. What types of analysis it will require.

It will require analyzing how the graphical elements in Mathematica work and how to control them with mathematical functions. It will also require an analysis of the thin lens and mirror equations and possibly the lens maker's equation. We will also analyze the different possibilities for interactive elements and simulation parameters.

4. Any potential challenges or pitfalls you anticipate.

We anticipate it to be difficult to figure out how to graphically represent our simulation as well as incorporate the interactive elements. We would like to make it possible to use multiple lenses however that may be too time consuming and difficult, but we will see when we know more about how to go about accomplishing it. We also anticipate difficulty combining the mathematical back end with the front-facing user interface.