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PHYS 230.001
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PHYS 230 Project Proposal

Describe the project:

Group members are Jonah Sundrud, Mitchell Hilbig, and Darian Comsa. The project is a projectile optimization simulator. The user will see a projectile launcher at a given height on the left and there will be random terrain on the right. The user will click to choose a target location and the projectile launcher will run an algorithm to find the optimized path (angle) to hit that location. An animation will show the projectile being shot along the path.

How the work will be divided among the group members:

The main parts of the project are the graphical user interface (GUI), the optimization algorithm, and the simulation of the launch. The three pieces can be split among the three group members. The most important functionality of each part will be finished first and if time permits more functionality will be added to it. The following functionality will be added approximately in order, as time permits:

1. Standard gravity, bullet mass, starting height, and terrain.
2. Random Barriers
3. Variable terrain
4. Elasticity factor
5. Air Resistance
6. Variable speed
7. Variable starting height
8. Variable bullet mass and size option
9. Variable gravity
10. Breaking barriers (deformation)
11. User control over pan/zoom
12. Light bullet options
13. Water and diffraction

What types of analysis it will require:

This analysis involves differential equations (kinematics) and algorithmically finding approximate solutions to them. Later functionality will involve elasticity energy absorption and transfer, air resistance differential equations, deformation equations, reflection and diffraction equations.

Any potential challenges or pitfalls you anticipate:

The algorithm may take too much time to properly implement and its approximation may not be very accurate. How good the simulation does at representing the solutions found will also be seen. Each additional functionality can introduce compounding errors and break previously working functions.