

## Criterion E: Evaluation

### Success Criteria:

1. The application can correctly calculate the range, maximum height reached, total time of flight, the initial height, the initial velocity, and the angle of launch from a given set of knowns. This criterion was met.
2. The application can correctly calculate the instantaneous velocity, the x and y components of that velocity, the instantaneous height (y), and the instantaneous distance (x) of the projectile from the point of launch at a given time. This criterion was met.
3. The application can display the path of the ball while it is in the air. In other words, a graph of the ball's motion can be shown. This criterion was partially met.
4. The application can determine if it cannot solve all the required variables in criteria one. This criterion was met.
5. The application is clear and easy to understand and use. This criterion was met.

### Future Improvements

The application overall meets all the criteria, however only partially on criterion 3, that was created, making it a success. The application only partially meets criterion three because with some values, the graph of the projectile's motion is not correct, and for others it is. Despite this, the application worked well for the client (me) and was successful in all its other functions. Although there was much success in this application, future improvements can still be made. Firstly, the graph could be fixed to be correct for all values and be made to be more complex. As of right now, the graph function of this application works for only some values. The logic of the graph must be changed to fix this. However as of right now, I am unable to fix this problem. Furthermore, the graph could be made to be more complex, because as of right now, it only has one scale. Meaning that if the motion of the projectile is not on the right scale, the graph will not clearly show the movement of the projectile clearly to the user as the line will be too large or small to see. In the future, if the graph were made to change its x and y scale, the graphs of all projectiles could be clearly shown.

Another improvement would be to fix the incorrectly returned values if the initial velocity is negative, or if the angle is greater than ninety degrees and such. When values such as these are inputted, the application still calculates and returns values, which are false as the equations break down if values like this are inputted. The improvement would be to limit the user to only be able to input proper values for the variables, so values that make sense and that are correct can be returned.

A third improvement would be to add several combo boxes to allow the user to select a unit of their choice for each of the variables. As of right now, the units are fixed. This improvement would allow for the user to have more freedom in what they can input and would overall make the application a more useful calculator. Logic for converting units and for displaying combo boxes would need to be added, but overall, this would be a relatively simple improvement.

**Conclusion:**

To conclude, the application was dually useful for improving my understanding of physics and programming making this process very beneficial to me. Also, with the improvements listed above and the functionality already in place, I believe that this application can be very useful to students around the world that need help with projectile motion or that need a way to check their physics work.