ME2302: Quiz Project #2

Go to the class website and find the Mathematica solution to Quiz 2 from Fall 2013. Use this solution as a guide to work the following problem in Mathematica. This is worth 1 quiz grade. Due Monday 2/3/14 at the beginning of recitation. This is individual work, but you may ask colleagues general Mathematica questions.

1. A model car has mass is \( m = R(1) \) slugs. The engine produces the force profile shown to propel the car. If there is a model cannon set up in line with the car and it is delayed 8 seconds before firing a projectile at an angle of 45 degrees, what muzzle velocity is required to hit the car? At what distance down range does it hit the car? Ignore any frictional forces. Use the six step process in Mathematica. Provide an animation of the trajectories of the projectile and car as they are moving down range. \( R(1) \) is the first nonzero digit of your student R-number. Once you have created the solution, study the varying differences in muzzle velocity as you change the delay time from 8 to 3 to 13 seconds. Plot results and comment on what is observed. Assume the cannon fires the projectile from the ground level like a mortar. Print your notebook and the results, use the cell structure of the notebooks and provide annotations of your results in the notebook.