ASE 211 Homework 13

Due: Friday, April 28 at 12:00 p.m.

The motion of an object (a baseball for example), subjected to the forces of gravity and air resistance proportional to velocity, can be described by the system of ODEs:

$$x''(t) = -cv(t)x'(t)$$
$$y''(t) = -cv(t)y'(t) - g$$

where the speed of the object is $v = \sqrt{(x')^2 + (y')^2}$, $g = 32ft/s^2$ and $c = 0.002$ for a baseball. Use the 4th order Runge-Kutta method to solve this system and answer the question: does the ball clear a fence which is 400 ft from home plate and 10 ft tall if the initial conditions are $x(0) = y(0) = 0$, $x'(0) = y'(0) = 100ft/s$? What if $x'(0) = 160$ and $y'(0) = 83ft/s$?

Plot x and y versus t and x vs. y.

Hand in all m-files.