ASE 211 Homework 2

Due: 12:00 noon, Friday, February 4. Put assignments in the drawer on the third floor of WRW marked 'ASE 211.'

Write a Matlab $m$-file which will implement Newton's method. The outline of the $m$-file is as follows:

```
function newton(x0,xtol,maxiter)
%
%  Matlab function which uses Newton's method to find the
%  roots of a given function funcf.
%
%  m-files funcf.m and funcfp.m which specify the function and its derivative
%  must be provided.
%
%  xtol is the tolerance used for stopping
%  x0 is the starting guess for the method
%  maxiter is the maximum number of iterations allowed
%
%
k=0;
x1=x0-funcf(x0)/funcfp(x0);
%
%  do until convergence
%
while (abs(x1-x0)>xtol & k <= maxiter)
.....
.....
.....
end
k
x1
funcf(x1)
```

Use your $m$-file to solve the following problem. The position of a ball, thrown upward with a given initial velocity $v_0$ and initial position $y_0$, subject to air resistance proportional to its velocity, is given as a function of time $x$ by

$$y(x) = \rho^{-1}(v_0 + v_r)(1 - e^{-\rho x}) - v_r x + y_0,$$

where $\rho$ is the drag coefficient, $g$ is the gravitational constant, and $v_r = g/\rho$ is the terminal velocity. Find when the ball hits the ground if $y_0 = 0$, $v_0 = 20m/s$, $\rho = .35$ and $g = 9.8m/s^2$. Take as your initial guess $x_0 = 1$, set $xtol = .0001$ and $maxiter = 50$.

Keep a diary of your matlab session. Hand in all $m$-files and your diary.