Due: Thursday February 10th, 2005.
Problems to be turned in

1. Use Newton's method to approximate within 10^{-4}, the value of x that produces the point on the graph of $y = x^2$ that is closest to $(1, 0)$.

2. Find enough terms in the Taylor Series for the function $f(x) = x(1 - \ln(x))$ at $x_0 = 2$, so that the truncation error is fourth-order $O((x - x_0)^4))$. Now once you have done that, print out the following figure: In one figure, use the subplot command to arrange 4 plots in a 2 by 2 grid. In the top left, plot the function and its first-order Taylor series. In the top right, plot the function and its second order Taylor series. In the bottom left and right plots, do the same with the third and fourth-order Taylor series respectively. Plot the function as a dashed line, and the Taylor series as a solid line on the x-axis from 0 to 5.

3. Write a matlab function file which uses a hybrid method of `Biseciton` method and the `regular falsi` method to find the root of
$$f(x) = x\sin(x) - 1$$
on the interval $[\frac{1}{2}, 2]$ to an accuracy of 10^{-6}. The script should first take a `regular falsi` step then a `bisection` step, then another `regular falsi` step and so on. Use the bracket size as your convergence criteria. Compare the steps necessary to obtain convergence with the number of steps that would be required by bisection. What advantage does the hybrid method have over the `regular falsi` method ?