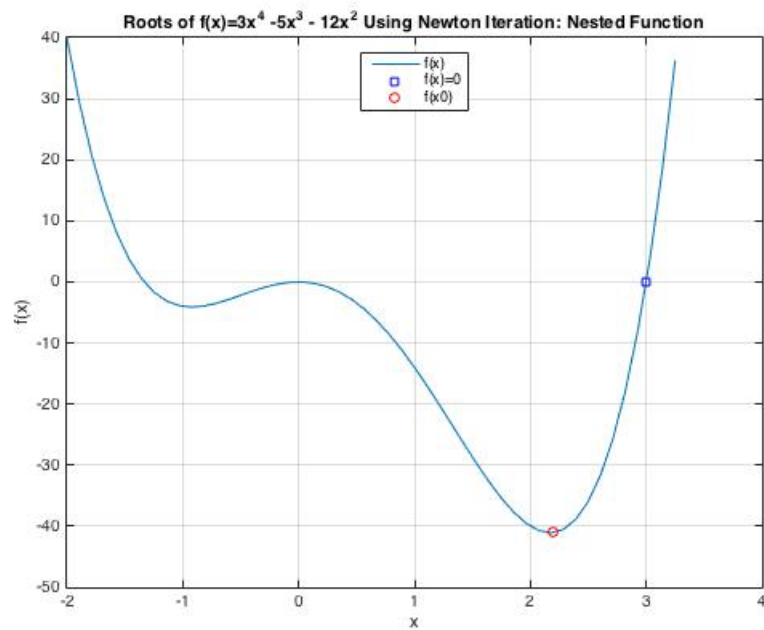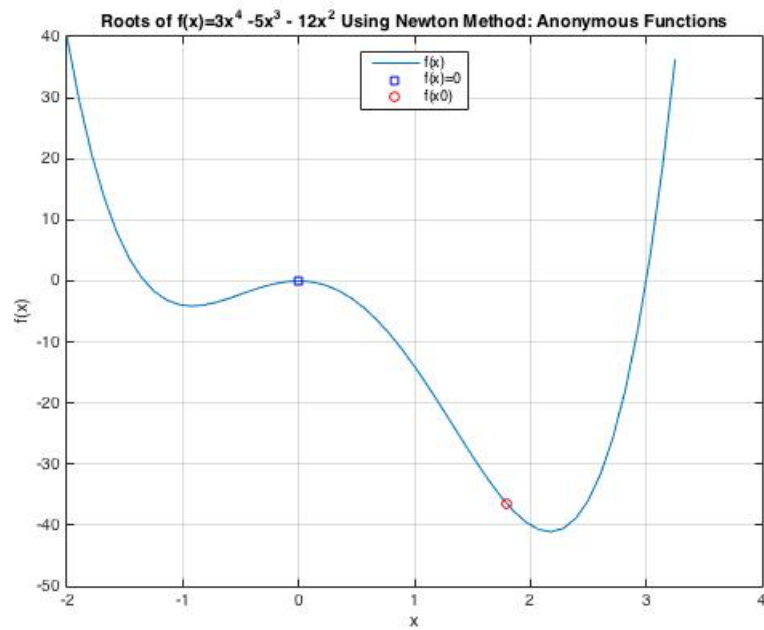# Chem/Stat3240: Homework 5a
Matlab

September 29, 2015

1. Modify the function `findRoot` you wrote in homework4b to a new function `findRoot1` that defines the function $f(x)$ and its derivative $f'(x)$ as anonymous functions within the body of `findRoot1`. The function `newtonRoot` should still be a subfunction of `findRoot1`. Generate a plot using `findRoot1` for the initial condition $x0 = 1.8$, and modify the plot title to indicate anonymous functions were used, as shown below .

2. Now modify the function `findRoot1` to a new function `findRoot2` that defines a nested function `newtonRoot2` within the body of `findRoot2` instead of as a subfunction. Since `newtonRoot2` is a nested function, be mindful of what arguments (if any) need to be passed to `newtonRoot2` from `findRoot2`. Generate a plot using `findRoot2` for the initial condition $x0 = 2.2$, and modify the plot title to indicate a nested function used, as shown below .

   Submit the functions `findRoot1` and `findRoot2`, with the associated plots generated by each to the collab site as well running the code on Cody.

Roots of f(x)=3x^4 -5x^3 - 12x^2 Using Newton Method: Anonymous Functions

Roots of f(x)=3x^4 -5x^3 - 12x^2 Using Newton Iteration: Nested Function

3. Download the function `P_inner` M-file from the Matlab Code Examples folder of the course Collab site. Modify that code to be a function `[P, xk, yk]=P_inner0(a,b,n)` that outputs row vectors `xk` and `yk` corresponding to the x and y coordinates of the `n` computed vertices.

Write a function `ellipsePerim(a, b, tol, plotsOn)` (including the specification) that takes the the inputs a, b, and tol and outputs the ellipse perimeter estimate $P\_out = P\_inner(a, b, n+1)$ such that

$$\frac{|P\_inner0(a, b, n+1) - P\_inner0(a, b, n)|}{P\_inner0(a, b, n+1)} < tol$$

Note this expression is similar to the relative error estimates we have used previous in the `MyCubeRoot` function.

If the input `plotsOn` is the character string `'on'`, the function ellipsePerim will create a plot of relative error versus number of vertices, and a plot of the computed vertices, as shown below. The plots should be saved programmatically as RelativeError.pdf and xyVerts.pdf.

Computed vertices for tol=1.00e-03
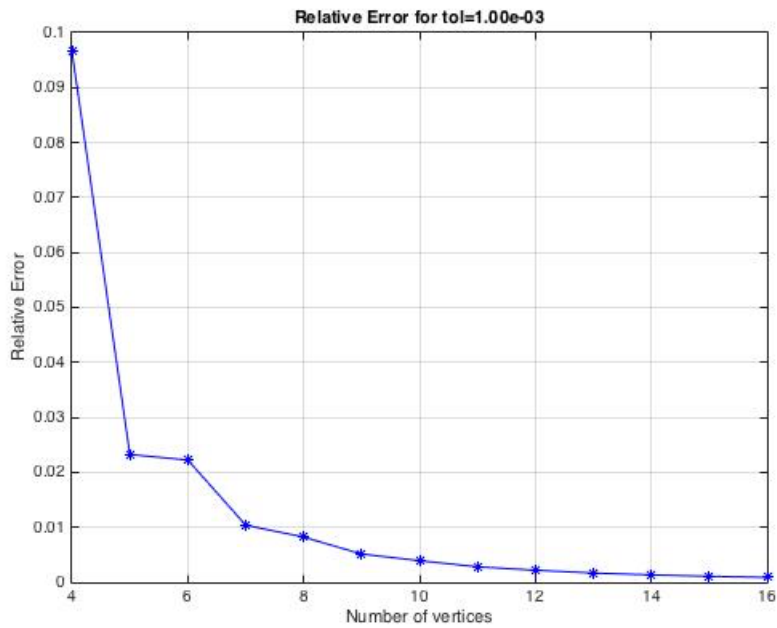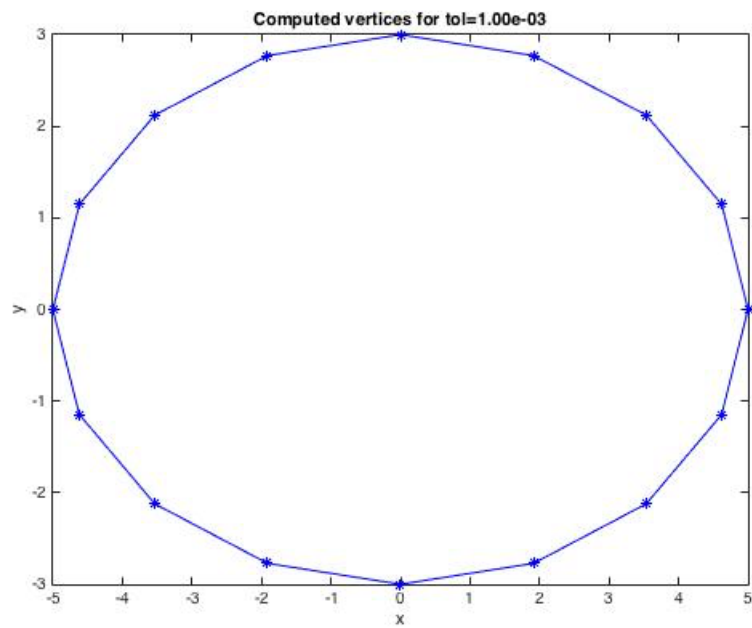
Include `P_inner0.m` as a subfunction in `ellipsePerim.m` Submit your code file for the functions `ellipsePerim`, to the course collab site as well as to Cody. Submit your plots to the collab site.

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