MAE 384 Homework #2

1. Solve the equation,

$$0.5\,x^2 - \sin(x) + 0.1 = 0\ ,$$

using Newton's method. Find all of the solutions. Please show your work by providing the detail of the intermediate steps of the iteration procedure.
When to stop: A solution with $|f(x_N)| < 0.0001$, where $f(x) \equiv 0.5\,x^2 - \sin(x) + 0.1$ and x_N is your numerical solution, will be considered satisfactory. **4 points**

Hints:

(i) Note that the argument x in $\sin(x)$ should be in radian, not degree. Make sure that you use "RAD" instead of "DEG" mode when evaluating $\sin(x)$ using a calculator. This is not a concern if you use Matlab, for which the radian mode is the default.

(ii) It is useful to visualize the problem before solving it. Try to make a plot of $f(x)$ and choose an initial guess that is close to one of the intersections of $f(x)$ and the zero line.

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2. Solve the equation,

$$0.1\,x^3 - e^{-x} = 0\ ,$$

using the fixed-point iteration method. Please show your work. A solution with $|f(x_N)| < 0.01$, where $f(x) \equiv 0.1\,x^3 - e^{-x}$ and x_N is your numerical solution, will be considered satisfactory.   **2 points**

You may choose to solve the problems in this homework by hand or by Matlab. Your choice will not affect the score. If a Matlab program is used to solve a problem, please provide the codes. This remark applies to all future homework assignments.