
MA386 - Introduction to Numerical Analysis
Homework Assignment 2, 100 points
Due In Class September 18

1. Section 2.2: 6, 12 a.
2. Write a MATLAB function m-file called `fixedpt.m` that implements Algorithm 2.2 on page 57. Input for the function should include all inputs listed on page 57 and an arbitrary function. Display the following information after each iteration: step number and the current point. So that you can check your code, here is my input and output for $f(x) = \cos(x)$, $p_0 = .2$ and $TOL = 10^{-2}$:

```
>> f = inline('cos(x)', 'x');  
>> fixedpt(f, .2, 10^-2, 100)
```

```
Step      pn  
1         9.800666e-01  
2         5.569673e-01  
3         8.488622e-01  
4         6.608376e-01  
5         7.894784e-01  
6         7.042157e-01  
7         7.621196e-01  
8         7.233742e-01  
9         7.495766e-01  
10        7.319774e-01  
11        7.438543e-01  
12        7.358642e-01
```

```
ans =
```

```
0.7359
```

Make sure the file is adequately commented. Include a printout of your code when you turn in your assignment.

3. Find the root of the function $f(x) = (1 - 3/(4x))^{1/3}$. Apply Newton's Method for 55 iterations. What do you notice? Explain why this example does not contradict Theorem 2.5.
 4. The polynomial $x^3 + 94x^2 - 389x + 294$ has zeros at 1, 3, and -98 . The point $x_0 = 2$ should therefore be a good starting point for computing either of the small zeros with Newton's Method. Carry out the calculation and explain what happens.
 5. Section 2.3: 18.
 6. Section 2.4: 2 a (with initial guess $p_0 = .5$). Repeat using the modified Newton-Rhapson method described in Eq. (2.11). Is there an improvement in speed or accuracy over Exercise 2? Explain why or why not.
- BONUS 10 pts. Section 2.2: 14. A fixed point iteration probably will not work as the equation is written, even for a smaller interval around the root. Explain why. Try deriving a new equation so that the fixed point method is guaranteed to converge to the solution to $x = \tan(x)$ on the interval $[4.4, 4.6]$, and explain why your method works.