

Lab 5 Practice

October 15, 2013

For both parts below, set $f(x) = x^4 - 11x^3 + 8x^2 + 22x - 20$. Plot this function for $x \in [0, 2]$. Note that the right-most root of this plot is at $x = \sqrt{2}$.

1. Use the Bisection Method to find, up to two decimal places, the right-most root of $f(x)$ on the plot you just made. The bisection method is:
 - Start with an interval $[a, b]$ with $f(a)$ and $f(b)$ having opposite signs.
 - Determine m the midpoint of this interval.
 - If $f(a)$ and $f(m)$ have different signs, set $b = m$. Otherwise, set $a = m$.
 - Repeat this process starting with the second step and continue until the length of the interval $[a, b]$ is small.

Starting with $a = 1.3$ and $b = 2$ will give good results.

2. Do the same thing with Newton's Method, this time up to 8 decimal places. Newton's Method is
 - Start with an initial guess near the root, x_0 .
 - Use the formula $x_1 = x_0 - f(x_0)/f'(x_0)$ to get your next guess.
 - Continue this process until $f(x_n)$ is close to zero.

Starting with $x_0 = 2$ should give good results.