Homework 6 :: MATH 504 :: Due Tuesday, October 18th, 11:59 pm

Your homework submission must be a single pdf called "LASTNAME-hw6.pdf" with your solutions to all theory problem to receive full credit. All answers must be typed in Latex.

1. (Coding) Apply a fixed point method to find a root of $\cos x = \sin x$ on $[0, \frac{\pi}{2}]$, by converting the equation into a fixed point equation

$$x = g(x) = x + \cos x - \sin x$$

given $x_0 = 0$. Note that $\cos \frac{\pi}{4} = \sin \frac{\pi}{4}$, so $x^* := \frac{\pi}{4} \approx 0.7853982$. Fill out the following table

k	x_k	$g(x_k)$	$e_k = \lvert x_k - x^* \rvert$	e_k / e_{k-1}
1				
10				
20				
30				

2. Let $f(x) = x^6 - x - 1$.

   a. Use 4 iterations of the Newton's method with $x_0 = 2$ to get an approximate root for this equation.

   b. Use 4 iterations of the Secant method with $x_0 = 2$ and $x_1 = 1$ to get an approximate root for this equation.

3. Consider the equation $e^{100x}(x - 2) = 0$. Apply Newton's method several times with $x^0 = 1$. What do you observe?