

**Homework #2**  
Math 131 - Spring 2017  
DUE on 2/7/17 at 1:30pm.

**NOTE:** *To get full credit, you must fully describe and explain your solution and attach printouts of your computer codes.*

1. Given the following functions

- $f(x) = x^3$  on an interval  $[1, 3]$ ;
- $f(x) = x^3$  on an interval  $[-3, 1]$ ;
- $f(x) = \sin x$  on an interval  $[-\pi/2, 3\pi/4]$ ;
- $f(x) = \begin{cases} 0, & x < 2 \\ -x + 3, & x \geq 2 \end{cases}$  on an interval  $[0.5, 5]$ ,
- $f(x) = \begin{cases} 0, & x < 2 \\ -x + 3, & x \geq 2 \end{cases}$  on an interval  $[2, 5]$ ,

- (a) Can Bisection algorithm be used to find the roots of any of equations  $f(x) = 0$  on the given intervals above (your answer should be a comprehensive explanation which is based on the theoretical results discussed in class)?
  - (b) Implement the Bisection method and use the code to solve those problems above that can be solved with this method up to tolerance of  $10^{-5}$ .
2. Use the code for Bisection method implemented above to find an approximation to within  $10^{-5}$  for the following equations
- (a)  $2x + 3 \cos(x) - e^x = 0$  for  $0 \leq x \leq 1$ .
  - (b)  $x^2 - 4x + 4 - \ln(x) = 0$  for  $1 \leq x \leq 2$  and  $2 \leq x \leq 4$ .
3. Use the code for Bisection method implemented above to find an approximation to  $\sqrt[3]{2016}$  corrected to within  $10^{-4}$ .