

1. Prove the following equations have exactly one real solution in the given interval (do not find the root)
  - (a)  $\cos x = e^x$  in the interval  $[-1, 1]$ .
  - (b)  $\ln x = \tan x$  in the interval  $(3, 4.5)$
2. Given  $f(x) = \sin 2x$  in  $[0, \pi/2]$ 
  - (a) Verify  $f$  meets the conditions of the Mean Value Theorem.
  - (b) Find the value(s) of  $c$  that satisfies the conclusion of the Mean Value Theorem.
3. For  $f(x) = |x^3 + 1|$  defined on the entire real number line
  - (a) Find all Critical Points
  - (b) Find all Inflection Points
  - (c) Use the First Derivative to find any max/mins.
  - (d) Use the Second Derivative to find any max/mins.
4. Graph  $f(x) = \frac{4x}{x^2 + 1}$ . Don't use a table of values and show all work.
5. Given  $f$  is a continuous function and  $f(0) = 0$  use the following table to graph the function  $f$

$x$	$-\infty$	1	4	6	$+\infty$
$f'(x)$	+	—	—	+	
$f''(x)$	—	—	+	+	