

1/24/2008  
Dr. Lunsford

MATH405 Numerical Analysis  
Quiz 2

Name: \_\_\_\_\_  
(20 Points Total)

Neatly show ALL of your work on separate paper. Attach this page to the front of your work. Write all numerical approximations to the accuracy of your calculator display and clearly indicate your answers.

I. Explain, using a basic theorem from calculus, why the derivative of  $f(x) = (x-2)\sin(x)\ln(x+2)$  is zero at least once in the interval  $[-1, 2]$ . HINT: You should not need to find the derivative to explain your answer! (5 points)

II. Let  $f(x) = \ln(x)$ . Please answer the following

- (a) Find the 4<sup>th</sup> degree Taylor polynomial,  $P_4(x)$ , centered at  $x_0 = 1$  for the function  $f(x)$ . You DO NOT need to simplify your answer by multiplying binomials. (6 points)
- (b) Use  $P_4(x)$  found in part (a) to approximate  $f(0.9)$ . (2 points)
- (c) What is the absolute error of the approximation in part (b)? Use your calculator approximation of  $f(0.9)$  as the actual value of  $f(0.9)$ . (2 points)
- (d) Find a bound for the absolute error if you use  $P_4(x)$  to approximate  $f(x)$  on the interval  $[0.5, 1.5]$ . I.e. the bound should work for all  $x \in [0.5, 1.5]$  (5 points)