

Math 611, Fall 2013

Show all your work. Due in class on September 17, 2013.

1. Problem 1 (25 points).

Find the smallest nonzero positive root of $x = \tan(x)$ using the bi-section method, with an accuracy of 0.0001. Note that the desired root is greater than $\pi/2$.

2. Problem 2 (25 points).

Find the smallest nonzero positive root of $x = \tan(x)$ using the Newton's method, with an accuracy of 0.0001. Note that the desired root is greater than $\pi/2$.

3. Problem 3 (50 points).

In this problem we compare the number of iteration required to reach a given accuracy between the bisection method and Newton's method for the first two problems. How many iterations are needed for Newton's method to reach an accuracy of $\epsilon = [10^{-7}, 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}]$? How many iterations are needed for the bisection method to reach an accuracy of $\epsilon = [10^{-7}, 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}]$? Plot the number of iteration versus ϵ for both methods to conclude which method is the better one for this problem.