

# Lab 4 for Math 215

Monday - February 13th, 2008

Student's Name: \_\_\_\_\_

**Instructions:** Show all your work for full credit. Indicate your answers clearly.

**Problem 1.** Use Newton's method to find solutions accurate to within  $10^{-5}$  for the equation  $e^x + 2^{-x} + 2 \cos x - 6 = 0$  for  $x \in [1, 2]$ .

**Problem 2.** Use Newton's method to find solutions accurate to within  $10^{-5}$  for the equation  $\sin x - e^{-x} = 0$  for  $x \in [0, 1]$ ,  $x \in [3, 4]$  and  $x \in [6, 7]$ .

**Problem 3.** The fourth degree polynomial  $f(x) = 230x^4 + 18x^3 + 9x^2 - 221x - 9$  has two real zeros, one in  $[-1, 0]$  and the other in  $[0, 1]$ . Approximate these zeroes to within  $10^{-6}$  using Newton's method.

**Problem 4.** Let  $f(x) = 3^{3x+1} - 7 \cdot 5^{2x}$ . Plot  $f(x)$  to find initial approximations to roots of  $f$ . Use Newton's method to find roots of  $f$  to within  $10^{-16}$ .

**Problem 5.** The sum of two numbers is 20. If each number is added to its square root, the product of the two sums is 155.55. Determine the two numbers to within  $10^{-4}$ .