

SULTAN QABOOS UNIVERSITY
DEPARTMENT OF MATHEMATICS AND STATISTICS

Math4141

Fall 2011

Quiz 1

Time: 30 minutes

Name:

Section:

Number:

In questions 1,2 and 3, show your complete, mathematically correct and neatly written solution.

Q1: Consider the function $f(x) = \ln(x) + x$. *(4 points)*

- (i) Find a closed interval $[a, b]$ that contains a root of $f(x)$. Justify your answer.
- (ii) Use the Bisection method to approximate a root in the interval you have found in part (i) (Do 2 steps/iterations only).

Q2: Consider the fixed point iteration $p_{n+1} = 1 + e^{-p_n}$. *(6 points)*

- (i) Prove that the iteration converges to a unique fixed point for any $p_0 \in [1, 2]$.
- (ii) Start with $p_0 = 1$ and find p_1 and p_2 .

Q3: Consider the function $f(x) = 1 - x + e^{-x}$. *(5 points)*

- (i) Does $f(x)$ have a zero in the interval $[1, 2]$? Justify your answer.
- (ii) Use Newton's method with $p_0 = 2.0$ and find p_1 and p_2 .

Good Luck